ELECTRICAL REVIEW

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18th June, 1948

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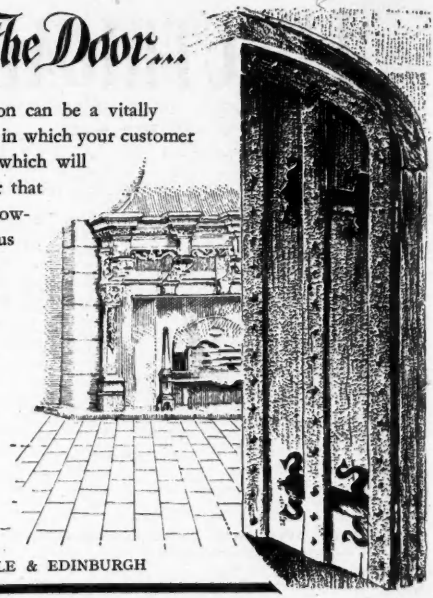

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLII. No. 3682 18th JUNE, 1948 9d. WEEKLY

Future Conventions

Next Year's Test and Opportunity

WHEN the Incorporated Municipal Electrical Association was forced into voluntary liquidation there seemed to be a danger of a serious gap in the business and social relationships of the electrical industry. For a very long time the Association's Convention has been the only annual event at which people from all quarters of the industry could get together to know one another and discuss common topics.

But nobody seriously thought that the gap would be allowed to develop. All were confident that the new authorities (who were very largely the men who have attended the I.M.E.A. Conventions) would see that the 1948 meeting, which was made possible by the British Electricity Authority, was merely the end of a chapter and not a final page of the record. Consequently all that was left for speculation was the nature of the conference which would begin a new chapter.

The Starting Point

The possible shape of conferences to come was adumbrated at Eastbourne last week. The nucleus, or starting point, will be a gathering of representatives of the nationalized electricity supply system (including some from the Consultative Councils) who will discuss their own domestic problems. Then for three or four days the B.E.A. delegates will join with representatives of the other electrical organizations and the scope of the discussions will be widened but will still cover only electricity supply matters.

Lord Citrine, saying that conferences were a good antidote to bureaucracy, thought that the arrangements would closely follow the lines of the I.M.E.A. Conventions, including technical papers, the popular social events and an exhibition. So far the details have not been settled but general agreement to the principle has been obtained and 1949 will see a British Electric Power Convention. If this is successful it will be the first of a new series.

Full Representation

Every interested body has been consulted and will be represented, but each may have some difficulty in settling its representation. There must be a limit to the total number but as the electricity supply delegates will probably be fewer than in the past there will be room for a proportionate representation of other interests. This is one of the subjects which will be considered by the sub-committee appointed to go into details.

No section must think that it is being "swamped." Possibly one reason why the 1935 National Electrical Convention was not repeated was the feeling that the electricity supply element was too predominant. This is inescapable because electricity supply is the foundation of the whole industry. The supply authorities are in the closest touch with the consumer and may be presumed to know best what he wants. They are the principal customers of the manufacturers, they have a great deal of control over installation work, and they have been the largest supporters of co-operative electrical research. Above all, they have shown the greatest cohesion.

Circumstances will be no different under the new order, except in the way of intensification. Other sections of the electrical industry will accept the position as it is but they will need assurance that they will be given a fair hearing in the Convention discussions. This will be largely in their own hands; each branch has many outstanding men who will be expected to make informed and valuable contributions.

We commend the idea of the British Electric Power Convention and ask that the fullest support should be accorded to it. There has been built up in the industry a tradition of service, goodwill and human relationship which is probably unknown in any other industry. Such a gathering, even more than the I.M.E.A. Conventions, will maintain and improve this spirit.

Small Undertakings

THERE are no small electricity undertakings now but their spirit lives on. In other words the Committee of Smaller Electricity Undertakings has decided to continue in existence for another year, albeit in a somewhat depleted form, for the engineers cannot remain as members. The municipal authorities concerned think that they can serve a useful purpose as watchdogs for their ratepayer-consumers although they have no direct voice in the control of their local electricity supply. There seems to be some disappointment among them that they were not given representation upon the Electricity Boards but it is not easy to see how any one of them could have been given a seat without much heart-burning among the rest. There should be more scope for them among the Consultative Councils whose views, Lord Citrine said at Eastbourne, would be treated with respect.

Birthday Honours

WE would have expected to see more "electrical" names among the King's Birthday Honours than proved to be the case, but experience has taught us that the electrical industry is not generally over-honoured. Nevertheless it was satisfactory to see that Mr. J. W. Simpson, so long the indefatigable secretary of the I.M.E.A., had been awarded the O.B.E.—an announcement which came at a very appropriate moment. Another well-known I.M.E.A. Convention personality was also in the list—Alderman J. C. Tibbits, of Walsall, receives the honour of knighthood. Many on the manufacturing side of the industry will also be pleased at the award of the M.B.E. to Mr. Felix Rogers, secretary to several of the trade associations and until recently of the Electrical Fair Trading Council, and the O.B.E. to Mr. G. R. Barclay, chairman of Wild-Barfield Electric Furnaces, Ltd. The contracting side of the industry is represented by Mr. G. N. Haden (O.B.E.) whose well-known company is a member of the Electrical Contractors' Association.

Purchase Tax Reductions

So disastrous were the effects of the doubling of the purchase tax on radio and television sets that the Chancellor of the Exchequer was practically forced to agree to revert to the lower rate of 33⅓ per cent. The imposition of a 100 per cent tax on space-heating and water-heating appliances was a drastic step which the Chancellor has also had to reconsider. He has decided to relieve gas appliances by reducing the rate to 66⅔ per cent, thus instituting a rather pernicious form of discrimination against electricity. Unfortunately he can produce some sort of justification for his decision so far as space-heating appliances are involved, at the moment, but we still contend that electric water-heaters are economic and efficient and have sufficient diversity to acquit them of the charge of adding to the peaks. Sir Stafford Cripps should be pressed to reduce the tax as soon as posible.

Electricity in Aircraft

ALTHOUGH the set of regulations just published by the Air Registration Board under the title of "British Civil Airworthiness Requirements—Section J. Electrical"—is in a form unfamiliar to most of our readers, it is in effect one of a trio which includes the Regulations for the Electrical Equipment of Buildings and of Ships. The present document was drawn up by a representative committee convened by the Institution of Electrical Engineers (from whom copies are obtainable at 3s. post free) and therefore carries a similar weight of technical authority. Developments are to be expected in this sphere that will no doubt call for periodic amendments. For that purpose the I.E.E. Committee will remain in being.

Telecommunication Equipment

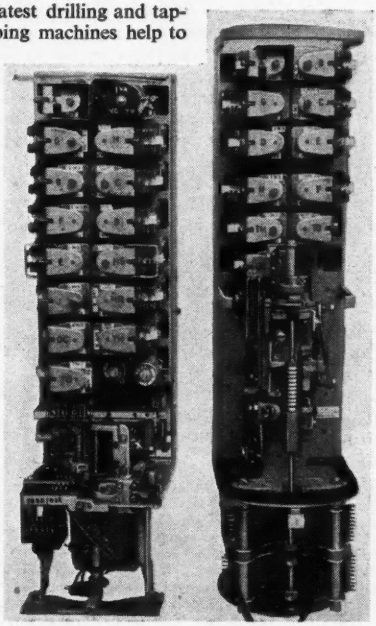
Nearly Three-quarters of the G.E.C.'s Output Going Abroad

EQUIPMENT for telecommunications, comprising telegraph, telephone, radio and signalling apparatus and valves, now represents almost a quarter of this country's electrical exports: £16,909,585 out of £74,333,867 worth of electrical equipment sent abroad last year was of this class and now the industry is aiming at exporting at least £1,650,000 worth of apparatus a month by the end of this year, which is equivalent to an annual figure of £19,800,000.

Nearly three-quarters of the output of the General Electric Co., Ltd., one of the largest British manufacturers of this type of apparatus, is now taken up by export orders and the tendency is still for the proportion to rise. Apart from valves, which are made at Wembley, this branch of the company's production has been concentrated mainly at four factories in Coventry and recently we were given an opportunity of seeing for ourselves the extent of the overseas contracts now in hand and also any special features of construction.

Although telephone exchange equipment, as well as a large proportion of other products, has in most cases to be constructed specially for each separate order, standardized components are utilized extensively. In the first part of our tour of the main works where most of the components are made, it was generally impossible, therefore, to distinguish between components for individual contracts but it is interesting to see the high-speed machinery and methods now adopted to give maximum output.

In the machine shops for instance thirteen automatic machines supervised by four men and four girls produce 375,000 screws a week. Aluminium relay shields are now formed in one operation by means of the impact extrusion method, and for blanking and piercing such articles as nickel-silver contact springs and insulating washers roller feed machines with an output as high as 5,600 an hour are used. The latest drilling and tapping machines help to



Our title illustration shows the wiring-up of a unit automatic exchange

Right: Comparison of new and old type "Strowger" selector switches. The latter is heavier and requires more space

speed up the preparation of light-alloy castings for selector switches and similar components. Dial instruction frames are made straight from the bar.

In general design, individual components of equipment are more or less standardized no matter for what part of the world they are intended, but the material and finishes employed are varied to meet individual climatic conditions. For example, all windings are impregnated with suitable media, generally either waxes or varnishes, in order to preserve sufficient insulation resistance and prevent electrolytic corrosion. Where timber is employed, as in cabinets and switchboards, this is usually teak, shellacked and waxed finished, which will withstand the ravages of tropical climates and insect pests. Special attention is given to the protection of iron, necessary in most magnetic circuits, and other metals, either by the use of electro-desposited coatings or lacquers and enamels.

The many laboratories are extensively equipped, facilities being provided for carrying out artificial tests at temperatures as low as —65 deg C, thus ensuring that products will be satisfactory under arctic conditions as well as in the tropics and deserts, and will also withstand the rigours of high altitudes liable to be encountered in the case of equipment used in aircraft and in the transportation of equipment by air. Both the standardized humidity test chamber and specially constructed chambers are used for simulating tropical conditions, and facilities are also available for simulating marine conditions and ultra-violet radiation. In the former chamber we saw hermetically-sealed relays, a comparatively recent development, undergoing routine tests, and also relay buffer blocks and zinc base die castings under investigation for tropical purposes. Another chamber in which a closely controlled temperature was available was being used for investigating the performance of quartz crystals at various temperatures.

Model vacuum-pressure plant is available for development of impregnation and allied processes. Mechanical life tests are carried out in a different department. Normal tests for typical telephone instrument components are 50,000 operations for the main springs of dials and 20 million impulses for the dials. Two-motion selectors are expected to operate at least one million times without failure.

In the condenser factory where 200 different types of units from 0·001 to 200 μF are made, modern methods minimize exposure to the atmosphere and the consequent absorption of moisture. Capacitors are cased and pre-dried for forty-eight hours before impregnation. For tropical service, special insulating fabrics and finishes are employed. Experiments are being made with synthetic varnish to improve the efficiency of moulded terminals. One of the latest types of radio condensers is now being made in spun metal tubes. These are proving very popular abroad and particularly large numbers have been taken by Turkey. We also saw a compact new type of condenser for incorporation in fluorescent lighting fittings.

Evidence of the preponderance of orders for the export drive was particularly pronounced at the company's separate self-contained factory in Helen Street, where relays are made in hundreds of different types operating at currents of from 1 mA to 1 A, and assembled in telephone selector switches. As chromium is used for finishing the essential metal parts, including pole-pieces and armatures, intended for export, it was not difficult to see that about 80 per cent of the work in hand was destined for abroad. Further indications of overseas destinations were provided by the impregnation of coils for tropical climates in synthetic resin, and by the use of special black varnished cloth, suitable for tropical use. This works produces about a half a million silver or platinum contacts every week. It is at this stage in the production of automatic telephone equipment that apparatus for individual orders begins to be assembled. Among the numerous jobs in hand we noticed under construction a fully-tropical private automatic exchange for Baghdad; a 600/3,000-line equipment for Allahabad; final selectors for Meerut; 90-line extension apparatus for

See opposite page—**(1) Testing supervisory control equipment for Henderson power station, New Zealand. (2) Selector plates undergoing test. (3) Railway signalling equipment for centralized traffic control on Colonial railways being tried out with the aid of a model railway. (4) This new 14-valve communications receiver covering frequencies from 150 to 350 kc/s and from 33 to 550 Mc/s is likely to be much in demand abroad. (5) Lock gate control equipment for Rangitata irrigation scheme, New Zealand. (6) Carrier-wave equipment nearing completion for a £500,000 order from Turkey. (7) Hermetically sealed relays, relay buffer blocks and various zinc base die castings undergoing test in a humidity chamber, which simulates tropical climates. (8) Assembling telephone dials for use in Singapore**

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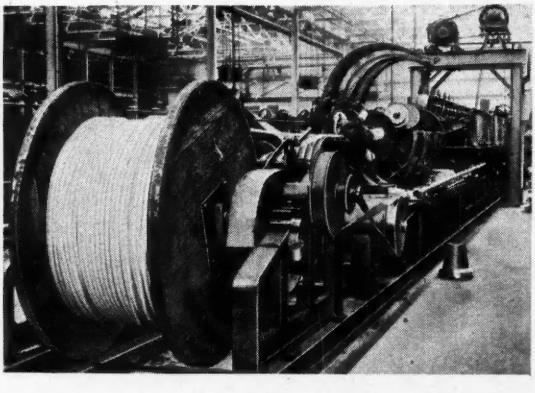
Port Antonio (Jamaica); manual equipment for Aba Warri, Kano, Oshoobo and Ibadan exchanges, Nigeria, and for Kandy, Ceylon; and test desk apparatus for Bethlehem, and for Wat Lieb (Bangkok).

Meanwhile, at another factory in Queen Victoria Road selector plates and relays are assembled from components made at the Helen Street works. Here one gets a good opportunity of comparing the older type of "Strowger" gear with the more modern "P.O.2000" or "P 2" selector. While the former is still preferred by many overseas buyers in the belief that it is more robust, the latter is much more compact, lighter, incorporates fewer magnets and is more readily removed from its rack and replaced by another unit. This factory is now producing about 1,600 plates a week (60 per cent tropical finish).

"Gecophones" ready for dispatch. The black models are for Iraq, the white for the Cunard White Star Liner, S.S. *Caronia*

In the wiring department at the main works, where the uniselector, group and final selector racks are wired, a further feature of tropical design is apparent. Instead of the usual textile-covered tinned copper wire, textile-covered tinned and enamelled wire is used because of its greater resistance to damp and insects. An idea of the amount of work in hand can be gathered from the fact that no less than 130 miles of wire is used each week. In the adjoining section where the equipment is inspected and tested we saw a 5,000-line extension for the automatic exchanges at Baghdad, rural automatic exchanges for Ceylon and Australia, and a private automatic branch exchange for Haifa.

There was also to be seen a supervisory control equipment covering power, street lighting and water heating being tested preparatory to shipment to Henderson power station, New Zealand. Another New Zealand contract nearing completion was for the remote control of five lock gates in the Rangitata irrigation scheme: a dial in the main control room will show the water level and the position of any gate, and an alarm bell will ring if the water exceeds a predetermined level. A further overseas application of automatic telephone technique, seen in the construction stage, was a fully-interlocked thirty-five section relay supervisory railway signalling system.



Telephone cables for export have special protective coverings. This 63-wire cable is for Australia

Apparatus in hand in the manual exchange section included some of the twenty-three teleprinter exchanges for Turkey, lamp signalling magneto switchboards and special apparatus racks for New Zealand, test desks for Baghdad

and Australia, a monitor's desk for Kandy, and various boards for Singapore and Galle.

The remarkable progress made in carrier-wave equipment design in recent years is apparent from the fact that a three-channel equipment, which formerly required three 10-ft 6-in. bays, now needs only one 8-ft 6-in. bay, which includes automatic pilot equipment (to raise or lower the amplification to keep the circuit steady under all weather conditions) and an a.c. unit. Most overseas countries are now adopting a.c. operation in preference to batteries. Tropical finish is standard for all carrier equipment, it not being worth while to retain the home finish for the comparatively small proportion of output for this country. We were particularly interested in the construction of the hermetically sealed carrier filters, together with their associated silvered mica condensers. The adjustable coils used are accurate to $\pm$ 0·5 per cent.

Radio Equipment

In the Radio Works in Spon Street v.h.f. transmitting equipment in course of construction included a 1-kW 45/90 Mc/s f.m. broadcast transmitter of a similar type to one already supplied for India; 100-W 30-130 Mc/s station transmitters; and 10-W 30-130 Mc/s models (in three ranges) for police, fire, ambulance, telephone and general services in all parts of the world. Several of the v.h.f. crystal-controlled receivers for the £300,000 communications contract in connection with the new Middle East oil pipe line referred to in our issue of 6th February were also to be seen, together with various other types of mobile transmitters and receivers.

A new 6-waveband bandspread receiver for export just going into production has normal flywheel tuning for medium (200-550 m) and two short-wave ranges (13½-40 and 40-125 m), with three bandspread ranges covering the 19, 25 and 31-m bands. Among broadcast receivers, besides the company's two standard models (the BC 4750 and 4850) a special export receiver, the BC4666, operating from a 6-V battery, is being made, with medium and three short-wave ranges.

In sections of the Helen Street factory, separate from the relay department, telephone instruments and special multi-core telephone cables are made. The former are designed to suit any climate, tropical coils and condensers being employed. Special pride is taken in the quietness of the dials and a new type of receiver being incorporated gives better reception. About 75 per cent of the "Gecophone" instruments are now going abroad and orders were in hand during our visit, for Ceylon, Singapore, Montevideo, South Africa, Iraq, Palestine, Transjordan and Pakistan. When intended for export, telephone cables, which are available with up to 204 wires, are immersed for about forty-eight hours in beeswax and they are then covered successively with layers of calico, tape, lead, foil, brown paper and cotton.

Reference has been made to a number of the jobs passing through the works. It is impossible to mention all of them but other important contracts in hand cover 22,000-line automatic telephone exchange equipment and modifications to existing German apparatus for Teheran (over £1,000,000); carrier-wave apparatus, teleprinters and exchange equipment for Turkey (£500,000); ship control equipment for various countries; extension of Baghdad central exchange from 5,200 to 8,400 lines and the provision of three new satellite exchanges totalling 8,000 lines; a new main exchange and a satellite for Basra; extensions to the Tel Aviv, Haifa and Jerusalem exchanges; several orders for New Zealand, including four exchanges for the Wellington (N.Z.) area; automatic exchanges for China; extension of main manual exchange at Lagos (400 lines); extensions of Singapore central exchange and two new satellites and Johore and Katong; extension at Wat Lieb and Bangrak (Bangkok) and two new satellites at Samsen and Ploenchitr; much rural automatic exchange equipment for Australia, Egypt, Malaya, the Gold Coast, Mauritius and elsewhere; private automatic branch exchange equipment for Brazil; railway signalling apparatus for Africa, South America and India; and sundry orders for automatic lift controls. Many inquiries have also been received from the Dutch East Indies for automatic exchanges and from Portugal and Finland for telephone transmission equipment.

E.P.E.A. Annual Dinner

THE Southern Divisional Executive Council of the Electrical Power Engineers' Association has decided to revive the annual dinner to the members of the National Executive Council. The function will be held at the Connaught Rooms, Great Queen Street, London W.C.2, on 25th September. Particulars can be obtained from the hon. secretary of the Southern Division, Mr. F. H. Smethurst, 118, New Kent Road, S.E.1 (telephone: Rodney 3085).

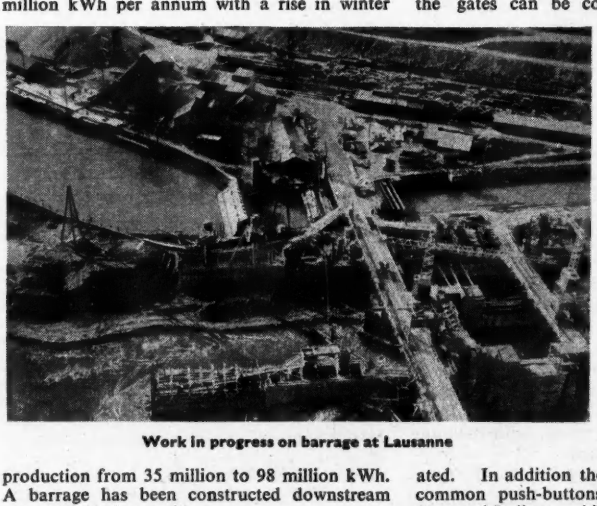
Ionospheric Transmission

THE complex nature of the subject made it necessary during the war to provide service personnel with a booklet outlining the fundamental principles of ionospheric transmission. With only slight modification this publication has now become generally available as " Radio Research Special Report No. 17—Fundamental Principles of Ionospheric Transmission." It is published for the Department of Industrial and Scientific Research by H.M. Stationery Office, price 1s. 6d. (55 cents U.S.A.).

This report describes the main properties of the ionosphere as a medium in which radio waves from a transmitting station are bent or reflected back to a distant receiving station. The effect of the angle at which the waves are projected from the earth is discussed, together with the influence of sunlight on the transmission and the resulting possibilities of communication. The text is necessarily of a descriptive theoretical nature, but the use of mathematics has been kept to the minimum so that the argument may be followed by as wide a circle as possible.

Swiss Water Power

IN 1945 the Lausanne Council adopted a plan to increase the output of the hydro-electric plant of the Bois Noir, near St. Maurice (Switzerland) on the Rhône, from 72 million to 326 million kWh per annum with a rise in winter production from 35 million to 98 million kWh. A barrage has been constructed downstream above the Rhône rapids.



Work in progress on barrage at Lausanne

Placed outside a sharp bend in the river, the water intake to the turbines (at the rate of 200 cu m per second) has two openings 4 metres high and 30 metres wide. The metal-cased concrete underground conduit, 7·75 m in diameter, has a total length of 3,860 m. The three 214-r.p.m. vertical-axis Kaplan turbines, each using 66 cu m of water per sec, are rated at 24,000 kW. A horizontal-axis turbine drives a 1,200-kW auxiliary generator.

The plant is operated from a control room outside the turbine house, and the voltage of generation is stepped up to that of the h.v. transmission system at an outdoor substation. The transformers are without regulating devices, control being at the alternators. The station is expected to be completed towards the end of 1949.

Remote Control of Irrigation

THE centralized control of switchgear by means of remote supervisory control systems has for many years been successfully applied to distribution networks both in this country and abroad. These well established principles have recently been applied by the General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2, to a network of a somewhat different nature.

In the Methven district of New Zealand, the Public Works Department is at present operating an irrigation scheme which incorporates a diversion race on the River Rangitata. The control of water flow through the various parts of the race is by means of radial or vertical lift check gates. If necessary, the motor operating the gates can be controlled locally, but in order to save time and personnel they are usually operated over pilot wires from a common supervisory control point.

Following the water course, a single pair of overhead pilot wires links together the five gate locations and terminates at the temporary irrigation headquarters, which houses the control panel and associated equipment.

Each gate is represented on the main panel by an indicator lamp and a lever-type "select" key. The lamp is normally extinguished, lighting only when the associated key is operated. In addition the panel carries a group of common push-buttons designated Up, Down, Stop and Indicate, which can be used to operate any gate, while an indicator in the form of a radial scale and pointer will give the position of any gate when required. All these operations are performed over the single pair of pilot wires using low voltage d.c. and 50 c/s signals.

Views on the News

Reflections on Current Topics

THERE is a good deal to be said for the contention that full shop lighting should be restored to assist tourist trade. The case for the removal of the restrictions on street lighting, however, hardly rests on argument if the special emergency conditions requiring them have passed. Being a night-time load, fuel and not plant is the main consideration, and in that respect the position is now easier, Steel remains a limiting factor in new installations. It is difficult, however, to discern the reason for the reported ban by the Ministry of Transport on the erection of lighting columns, valued at £3,228, which were ordered by Kidderminster Corporation and are now held by the Midlands Electricity Board.

* * *

Modern methods have a staunch supporter in Eire in the Very Rev. Fr. Hayes, leader of a non-political organization known as *Muintire na Tire*, which, a correspondent tells me, is concerned with the promotion of industry and commerce by local initiative. At a recent ceremony at Bansha, Co. Tipperary, when electricity was switched on for the first time, Fr. Hayes spoke of the many advantages which rural electrification will bring to country people. The scheme at Bansha, which is expected to be completed by August, will serve more than 500 families. A small factory has also been opened, the capital having been subscribed mainly by local shopkeepers and farmers.

* * *

At the I.M.E.A. Convention Exhibition last week I amused myself seeing how many of the cookers on show there had grill compartment doors so designed that crumbs, etc., do not collect in an inaccessible cavity underneath. This failing is one of my *bêtes noires* and, as some manufacturers demonstrate, is quite easily avoided. Nevertheless, less than one-third of the models I looked at were completely satisfactory in this respect. Unless cleaning is practically inevitable, experience shows that even the most diligent housewife will not take the trouble. In any case why should she have to employ ingenious devices—or even take the cooker to pieces! —to keep her apparatus spick and span? Electric cooking is the cleanest and most hygienic method of preparing food: everything should be done to maintain and increase this advantage.

* * *

I am one of those who (not from political motives) have expressed a certain dislike of the "Mummy Forgot to Switch it Off" poster, but Lord Citrine's defence of the production at Eastbourne last week convinced me that much of the objection to it was not free from political prejudice. But I am not sure that he persuaded me that the poster was all that it might have been and if he did I must say (with Samuel Butler):—"He that complies against his will is of his own opinion still."

* * *

There should, one feels, be some connection between the subject of this year's Kelvin Lecture, in which Dr. B. H. C. Matthews discussed the electrical aspects of the nervous system, and a report from Moscow on the grafting of an electrically powered mechanical heart into a dog. The animal is said to have lived for three months afterwards, during which time it was able to bark and run about. This would seem to indicate that it was a battery-operated and not a mains-operated heart, and it is interesting to surmise whether the difficulty of recharging the battery led eventually to electrical heart-failure.

* * *

Mr. R. V. Macrory's record of fifty years as the chief electrical engineer of a municipal (or any other) electricity undertaking is unique, so far as I can ascertain. I believe that there have been cases of men rising to the position during half a century's service, but Mr. Macrory started at Londonderry as a full-blown "chief" at the tender age of twenty. Another distinction enjoyed by Mr. Macrory is that of being one of two men in these islands—the other being Mr. W. J. Girvan of Belfast—who are still municipal electrical engineers.

* * *

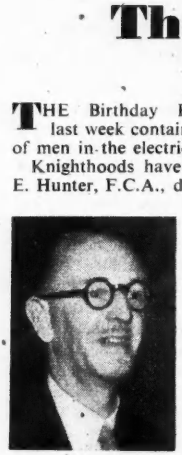
Saying of the week: "The road to Carey Street is paved with good inventions" (Mr. Oliver Lyttelton speaking in the second-reading debate on the Development of Inventions Bill).—**REFLECTOR.**

The Birthday Honours

Awards to Electrical Men

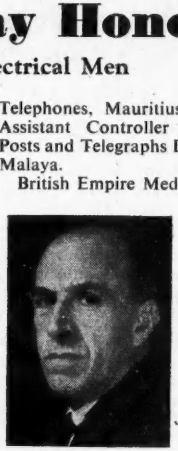
THE Birthday Honours List published last week contains fewer names than usual of men in the electrical and allied industries.

Knighthoods have been conferred upon Mr. E. Hunter, F.C.A., deputy chairman and managing director of Dorman Long & Co., Ltd., and president of the British Iron & Steel Federation, and Ald. J. C. Tibbits, a past chairman of the West Midlands J.E.A.

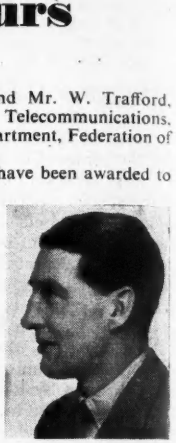


Mr. J. W. Simpson

Mr. F. A. Rogers



Mr. G. R. Barclay



Mr. G. N. Haden

Mr. G. F. O'Dell, M.I.E.E., Director of Contracts, General Post Office, becomes a C.B.E.

In the lists of O.B.E.'s are the following:—Mr. G. R. Barclay, chairman of Wild-Barfield Electric Furnaces, Ltd., Mr. G. E. Condliffe, M.I.E.E., director of Electric & Musical Industires Research Laboratories, Ltd., Mr. R. J. Dippy, A.M.I.E.E., Senior Principal Scientific Officer, Ministry of Supply, Mr. G. N. Haden, M.I.MECH.E., chairman and managing director of G. N. Haden & Sons, Ltd., Mr. H. Hill, M.I.E.E., lately Staff Controller, North Eastern Region, G.P.O., Mr. J. W. Simpson, lately secretary, I.M.E.A., Mr. W. J. F. Wellard, M.I.E.E., A.M.I.MECH.E., Superintending Mechanical and Electrical Engineer (Grade II), Air Ministry, and Lt.-Col. R. C. Instrall, B.A., A.M.I.E.E., Royal Corps of Signals.

Among those who have been awarded the M.B.E. are Mr. W. H. Darlington, M.SC., A.M.I.MECH.E., A.S.R.AE.S., engineer, Metropolitan-Vickers Electrical Co., Ltd., Mr. L. H. Hayward, chief inspector, Kolster Brandes, Ltd., Mr. W. G. Patterson, deputy general works manager, Siemens Bros. & Co., Ltd., Mr. J. M. Platt, technical manager, Instrument Department, Laurence, Scott & Electromotors, Ltd., Mr. F. A. Rogers, director and secretary of trade associations attached to B.E.A.M.A., Mr. H. Shaw, A.M.I.E.E., Area Engineer, G.P.O. Blackburn, Mr. G. M. Tomlin, A.M.I.E.E., chief development engineer, Salford Electrical Instruments, Ltd., Mr. W. T. A. Nicholson, A.M.I.E.E., Electrical Engineer, Suva Town Board, Fiji, Mr. R. T. Stevens, Assistant Director, Electricity and Telephones, Mauritius, and Mr. W. Trafford, Assistant Controller of Telecommunications, Posts and Telegraphs Department, Federation of Malaya.

British Empire Medals have been awarded to Mr. J. Atherton, laying-up machine operator, British Insulated Callender's Cables, Ltd., Mr. M. C. Lower, jointer, Submarine Cables, Ltd., and Mr. W. T. Wappett, electrical wireman, Dunston power station, North Eastern Electric Supply Co., Ltd.

Servo-mechanism Courses

IT has long been felt that the basic fundamentals of servo-mechanism (automatic control) have been neglected in the training of the rank and file of our engineers. Aware of this weakness in normal engineering syllabuses, the Inter-departmental Technical Committee on Servo-mechanism of the Ministry of Supply secured the co-operation of the Ministry of Education, the Scottish Home Office and various educational institutions throughout the country. As a result courses designed to meet this need, particularly in regard to training instructors, will be held during the next few months in London, Birmingham, Newcastle and Edinburgh, where the first course begins on 18th June. These courses will include lectures on basic principles, general applications and applications of particular local significance. It is hoped at a later date to organize similar courses in other important centres.

So far courses scheduled for this year are: Heriot Watt College, Edinburgh, 15th-18th June; Central Technical College, Birmingham, 5th-9th July; Northampton Polytechnic, London, 12th-16th July; Central Technical College, Birmingham, 30th August to 4th September; King's College, Newcastle, 1st-3rd September. Further particulars can be obtained from these establishments.

PERSONAL and SOCIAL

News of Men and Women of the Industry

A SCIENTIFIC Advisory Committee has been appointed by the British Broadcasting Corporation "to advise on scientific research and its correlation with external activities in the same field." The following have accepted invitations to serve on the committee:—Chairman: Sir Edward Appleton, G.B.E., K.C.B., F.R.S., Secretary, Department of Scientific and Industrial Research. Vice-chairman: Sir John Cockcroft, O.B.E., F.R.S., Director, Atomic Energy Research Establishment. Other members: Dr. H. G. Booker, Christ's College, Cambridge; Professor Willis Jackson, Imperial College of Science and Technology; Dr. R. L. Smith-Rose, Department of Scientific and Industrial Research, and Professor F. C. Williams, O.B.E., Electro-Technical Laboratory, Manchester University.

Mr. R. V. Macrory, M.I.E.E., has completed fifty years as city electrical engineer of Londonderry, and on 7th June he was the guest of honour at a civic luncheon given by the Mayor and Corporation to mark the occasion. Tributes were paid to Mr. Macrory by the Mayor, the town clerk, Mr. T. D. Christie, chief engineer of the Electricity Supply Board, and others, during which the progress made by the undertaking under Mr. Macrory's supervision was referred to. Mr. Macrory, in reply, said that it would have been impossible for him to have carried on so long had he not had the confidence and support of the various chairmen and members of the Corporation. He also paid tribute to the loyalty of the staff.

Following the luncheon, members of the Corporation and the guests and their wives were shown over the power station and entertained to tea. Mr. S. Spence, chief assistant engineer, who presided, said that all the members of the staff hoped that Mr. Macrory would be with them for many years to come and promised him the same loyal support he had received in the past. A silver salver was presented to Mr. Macrory on behalf of the staff.

Mr. E. J. Mathieson, D.F.H.(HONS.), A.M.I.E.E., has been appointed superintendent of workshops, Government Electricity Undertakings, Lagos, Nigeria. Mr. Matheson went to India in 1942 where he became superintendent of telegraph workshops, returning to this country last January.

Mr. R. A. Simpson has joined T.M.C.-Harwell (Sales), Ltd., as representative for Scotland, the four northern counties of England and Northern Ireland in place of Mr. G. H. Phillips, M.B.E., who has resigned. Mr. Simpson was for many years with J. A. Crabtree & Co., Ltd.

Mr. Norman Swindells, M.A., PH.D., has been appointed chief metallurgist to the Birmingham works of McKechnie Brothers, Ltd.

Mr. J. Billcliffe, A.M.I.E.E., has been appointed manager of the Nuneaton district of the Leicestershire and Warwickshire sub-area No. 3 of the East Midlands Electricity Board in place of **Mr. J. Lightbown,** who is now manager of the Lincoln district. The appointment dates from 1st June. Mr. Billcliffe became deputy electrical engineer at Nuneaton in April, 1947, and was previously with the Preston, Eastbourne and Cheltenham undertakings.

Mr. R. G. Brandon has been appointed general sales manager, Lamp and Lighting Department, of the British Thomson-Houston Co., Ltd. After serving in the 1914-18 war he spent four years in an armature winding and electric motor repairing business. He joined the B.T.H. Co. and his association with that company has to date lasted almost a quarter of a century. From the beginning he was concerned with the sale of electric lamps and after working in the Lamp Sales Department for a number of years he was in 1932, made sales manager, Southern England. In 1945 he was appointed manager, lamp and lighting sales, in succession to the late Mr. E. Coote, and in the same year he became a director of the Hotpoint Electric Appliance Co., Ltd.

Mr. R. G. Brandon

As from the 18th May, **Mr. R. T. Pardoe,** sales manager for switchgear and transformers, assumed the additional responsibility of the sales management of Crompton Parkinson instruments and meters.

Brigadier A. Levesley, O.B.E., M.C., T.D., a director of Edgar Allen & Co., Ltd., has been appointed honorary colonel of the 49th (West Riding and Midland) Armoured Division R.E.M.E. The appointment is for five years with effect from 30th April, 1948.

We regret that the caption to the picture of the reception by the I.M.E.A. President of **Mr. and Mrs. L. Howles** on page 921 of our last issue erroneously gave the names of Mr. and Mrs. G. A. Vowles.

Mr. F. Leddy, governing director of Philips Electrical Industries in Australia, recently left for a world trip embracing the United States, Great Britain and Holland.

The Manchester Area Radio Industries Club has elected **Mr. E. G. Freeman** (Ever Ready (Great Britain) Ltd.) as president for the ensuing year.

Mr. G. M. P. McKellem has been appointed secretary of the Manchester Association of Engineers in succession to Mr. T. Makemson who will relinquish his position on the 30th of this month. The Association is changing its address which as from 1st July will be 20, Booth Street, Manchester, 2 (telephone, Central 2796). A revised list of members is now available.

The I.E.E. Benevolent Fund will benefit to the extent of £19 from the golf competition organized at the I.M.E.A. Convention, Eastbourne. The winner was Mr. F. Favell (Stoke-on-Trent) with Mr. P. F. Clark (Clough, Smith & Co.) second. Messrs. H. Nielson (G.E.C.), D. G. Sutherland (Scottish Cables), J. N. Waite (B.E.A.) and D. R. Williams (Grimsby) tied for third place. As it had proved impossible to obtain the usual replica of the Dennis Trophy presented to the winner, Mr. Favell received instead a coffee percolator of modern design.

On 5th June, members of the London Office Social Club of **Crompton Parkinson, Ltd.,** went to Broadstairs, Kent. This was the Club's first outing since the war. The party of 134 travelled in motor-coaches, and were entertained to lunch and tea at the Grand Hotel. After lunch Mr. J. Harwood Fryer, joint managing director, took the opportunity of presenting tokens of long service to three members of the staff. Mr. S. H. Auger, who joined Crompton & Co., in 1896, fifty-two years ago, received the long service gold medal, a special award held by the employee with the longest service in the company's home organization. Gold watches in recognition of more than twenty-five years' service were presented to Miss D. Whittaker, and Mr. T. H. Windibank, a director.

The employees of **Holland House Electrical Co., Ltd.,** Glasgow, and branches, held their annual outing on 7th June. The party was conveyed in buses to Prestwick for lunch, and then had a break at Dunure for a short sports programme. They then proceeded to Girvan for tea, and had about one hour to enjoy the amenities there. The directors present were Messrs. A. S. Wraight, A. Glenister, F. Dunnet, J. A. Bairner and G. W. Paterson, and Mrs. Wraight presented the prizes.

Tribute was paid to a pioneer in two quite distinct scientific fields when a dinner was given by the directors of Bakelite, Ltd., to **Sir James** and **Lady Swinburne,** to celebrate their golden wedding. In the early years of the present century, Sir James was among the foremost authorities on electrical engineering and at the time of his election to the presidency of the Institution of Electrical Engineers in 1902 he was the youngest to have held that office. He was engaged in pioneer work on electric lamps with Swan, for whom he started a factory in Paris and later in the United States. Subsequently he did a good deal of work on dynamo development with Crompton. Some of the fundamental vocabulary of the electrical engineer owes its origin to Swinburne; words such as "stator" and "rotor" were coined by him. He was elected a Fellow of the Royal Society in 1906. A few years earlier he became interested in plastics and in 1904 started a company called the Fireproof Celluloid Syndicate, Ltd., of which Bakelite, Ltd., is the direct successor, and Sir James has maintained an active interest in the affairs of the company from its inception.

This year Sir James also celebrates forty-four years' active chairmanship of the company and his ninetieth birthday. The dinner at the Dorchester Hotel was attended by directors and executives of the Bakelite organization and by members of the Bakelite Old Timers' Club.

Sir James Swinburne, Bt., F.R.S., with Lady Swinburne, receiving guests at the reception given by the directors of Bakelite, Ltd.

Among those who spoke were Mr. H. V. Potter, managing director, Mr. F. J. Robinson, director and general works manager, Mr. C. C. Last, general distribution manager and Mr. C. G. Heywood, director.

Obituary

Professor P. H. Fraenkel, a lecturer in electrical engineering at the University of Western Australia for over thirty-four years, died recently. He was sixty-seven.

Mr. D. F. Harrison.—Mullard Electronic Products, Ltd., announce the death, at the age of forty-nine, of one of their joint general managers, Mr. D. F. Harrison, who died on 8th June. Mr. Harrison had served with the Mullard Company, in various capacities, for twenty-one years. He joined the company as a technical representative and became, in succes-

sion, accessories sales manager, sales manager, and then joint general manager of valve interests. He was previously with the Rolls Razor Company, and before that with the Fuller Accumulator Co. He was intimately concerned with the affairs of the B.V.A., the R.I.C., and B.R.E.M.A.

Mr. S. H. Francis.—The death has occurred of Mr. S. H. Francis, commercial manager of the Steel Foundry Department of Edgar Allen & Co., Ltd.

WILLS.—Mr. Thomas Henry Sanders, of Ilfracombe, electrical engineer, who died on 14th March last, left £6,559 gross (£6,286 net).

Mr. John William Elliott, retired sales manager of the Edison Swan Electric Co., Ltd., who died on 9th February last, left £6,007 gross (£5,919 net).

Mr. Ernest Philip Elwin, of Clyst St. Lawrence, Devon, retired electrical engineer, who died on 25th December last, left £6,531 gross (£6,323 net).

Mr. David Fulton, M.I.E.E., late divisional engineer for the Docks at Swansea, Port Talbot and Fishguard, who died on 23rd January last, left £13,778 gross (£13,711 net).

Mr. George Ruston Sharpley, chairman and a former managing director of Ruston & Hornsby, Ltd., chairman of Davey, Paxman & Co., Ltd., and a director of other companies, who died on 11th January last, left £79,187 gross (£78,928 net).

Mr. C. H. Hunt, of A. H. Hunt, Ltd., condenser manufacturers, Wandsworth, left £334,969 gross (£321,288 net).

Mrs. Ethel Lamb, wife of Mr. H. C. Lamb, late chief electrical engineer and manager of the Manchester Corporation Electricity Department, left £11,288 gross (£11,209 net).

Mr. E. S. Conradi, chairman and managing director of the British Central Electrical Co., Ltd., left £11,569 gross (£9,217 net).

Mr. W. R. Row, technical manager of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., who died on 10th March last, left £11,723 gross (£11,670 net).

Mr. E. B. Pausey, A.M.I.E.E., superintendent at Wallasey generating station, who died on 21st December last, left £3,529 gross (£3,488 net).

Trolley-buses in South Africa

IT is reported that Bloemfontein City Council Transportation and Electricity Committee is to investigate the advisability of using trolley-buses instead of the present diesel buses, or alternatively of disposing of the service to a private company. Fifteen years ago trolley-buses were abandoned because it was found that with the scattered population and absence of steep hills they were not more economical to run than motor-buses. Since then, however, the city has grown considerably. Poles are still standing on many of the old routes.

Australian Notes

From Our Australian Correspondent

THE second of two turbo-alternators for the Kalgoorlie Electric Power Corporation, Ltd., has been unloaded at Fremantle.

The Prime Minister (Mr. Chifley) stated recently that orders for electrical equipment placed by the Sydney County Council in Great Britain had now been transferred to Switzerland, but it would still be some time before they could be filled.

The general manager of the State Electricity Commission of Western Australia (Mr. W. H. Taylor) states that the first 66-kV underground cables in Australia will be used in connection with the new generating station at South Fremantle. This is necessary owing to regulations made by the Department of Civil Aviation. The new station is scheduled to start operation at the end of 1949.

The trams of New South Wales continue to show losses, despite higher fares. The amount collected, for the past financial year was £5,214,358 (£1,123,886 more than in the previous year), but expenditure rose to £5,341,368 (an increase of £1,247,675).

The New South Wales Railways have ordered a main-line electric locomotive for experimental use. It is expected that orders will shortly be placed for 250 new "R.I." class trams at some £8,000 per car by authorities in Sydney.

The Western Australian Minister for Transport (Mr. Seward) announces that the first instalment of 50 trolley-bus chassis ordered from England about four years ago should arrive at Fremantle during July.

The Commonwealth Bureau of Census and Statistics reveals that the percentage of wages and salaries to the value of production in the years 1938-39 and 1945-46 have varied as follows: Electric light and power, 21·54 in 1938-39 and 20·35 in 1945-46; electrical machinery and equipment, 58·20 and 66·36; and engineering, 53·75 and 65·36.

The Sydney County Council is debating whether it shall rescind restrictions imposed in 1942 on its sale of certain domestic electrical equipment. Restrictions apply to the sale and hire of ranges, storage hot water heater systems, instantaneous water heaters, 1½- and 3-gal. sink heaters, domestic lighting fittings and domestic wash-boilers. The chairman (Councillor Cramer) said that he was opposed to the Council's embarking on an all-out sales campaign under which the people's money could be used in competition unfair to local trade.

The chairman of Metal Manufactures, Ltd. (Sir Alexander Stewart) announces that arrangements for the manufacture in Australia of paper-insulated power cables are almost complete. (Such cables have previously been imported from Britain). British Insulated Callender's Cables, Ltd., and other British interests will collaborate in the enterprise.

PARLIAMENTARY NEWS

By Our Special Reporter

IN the House of Commons last week Captain Crowder asked the Minister of Fuel and Power if he would make a statement regarding the breakdown of the electricity service on Sunday, 23rd May. Mr. Peter Roberts asked whether he proposed to make any regulations under Section 60 (1) of the Electricity Act, 1947, so that in the event of a repetition of the general breakdown of the supply of electricity, there would be available before Parliament, as soon as possible, a full report, and Mr. Henderson Stewart asked what action he took between 23rd May and 3rd June, 1948, in pursuance of the powers vested in him by Section 5 (1) of the Electricity Act, 1947; and what information he obtained under Section 5 (5) of the same Act during the same period.

Mr. Gaitskell said that Regulation 21 (*c*) of the Electricity Supply Regulations, 1937, was sufficient to ensure that reports on such breakdowns in supply were submitted to him by the Electricity Boards. There was therefore no occasion for him to ask for information under Section 5 (5) of the Electricity Act, 1947. The Chairman of the British Electricity Authority made a very full statement on Monday, 24th May and, as he had not yet received the reports under Regulation 21 (*c*), he had nothing to add.

Mr. Stewart asked if Section 5 (5) empowered the Minister to issue directions to the British Electricity Authority, and could it possibly be that, following upon an electricity breakdown which stretched from the East Coast to Bristol and Plymouth and affected all stages of life, the Minister took no steps to instruct them at all? Mr. Gaitskell said it would obviously be extremely foolish to issue directions before one had received a report of the whole affair.

Captain Crowder asked if the reports in the Press of the reasons for the breakdown were correct. Mr. Gaitskell said he thought the causes were fairly clear—shortage of plant and an excessively bad spell of cool weather, combined with two breakdowns on the line.

Cheese Ration for Electrical Workers

Mr. John Lewis asked the Minister of Food if he would grant the extra cheese ration to electrical workers engaged on overhead line work, laying cable, jointing and changing transformers in the open who, in view of the strenuous conditions involved and frequent inaccessability of shops in country districts, had to rely entirely on sandwiches. Dr. Edith Summerskill said that workers regularly employed on the construction or maintenance of power transmission lines or cables traversing open country were already eligible for the special cheese ration. The concession could not be extended to workers intermittently employed for short periods in country areas.

Purchase Tax Concessions

Mr. Jay, the Economic Secretary to the Treasury, announced purchase tax concessions to include a reduction from 100 per cent to 66⅔ per cent on gas-operated space-heating and water-heating appliances; from 66⅔ per cent to 33⅓ on radio receiving sets of the domestic, portable or road vehicle types, together with kits of such sets and valves suitable for use in them. These reductions will operate from 16th June. Television sets are included in the concessions but not radio-gramophones.

Consultative Councils

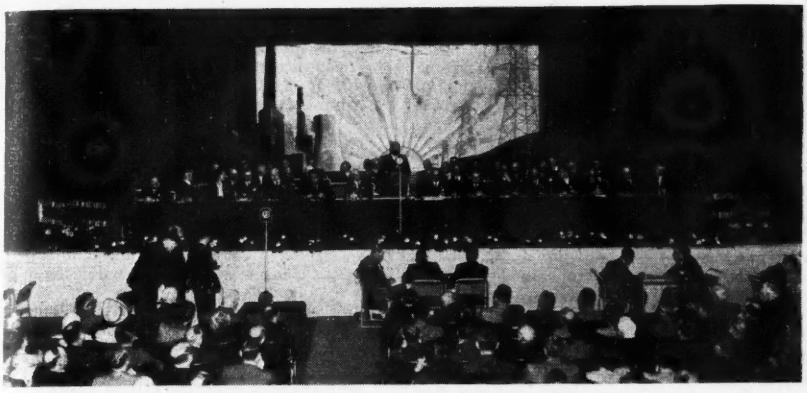
Mr. Ernest Davies asked the Minister of Fuel and Power what steps had been taken to establish Consultative Councils as provided in Clause 7 of the Electricity Act, 1947. Mr. Gaitskell said that the necessary regulations were laid on 28th April and came into operation on 3rd May. He had consulted all the organizations which he was required to consult under the Act but had not yet received final replies in all cases.

Better Street Lighting

Mr. Barnes, Minister of Transport, stated on Monday that, whereas lighting authorities now generally worked to the figure of 50 per cent of pre-war consumption of fuel for street lighting, he was prepared to agree to an increase to 75 per cent in view of the need on safety grounds, for a better standard of street lighting.

I.E.E. Students' Section

THE annual report on the activities of the I.E.E. Students' Section shows that the present membership of 3,534 includes 1,128 graduates under twenty-eight years of age. Twelve meetings were held last session and five full-length papers were presented, compared with three during the previous year; attendance averaged ninety-five, or 2·7 per cent of the section membership. Nineteen visits were arranged, or twenty-seven including repeats, and a number of social functions. Several events were jointly arranged with the "Civils" and "Mechanicals." At the invitation of the London Sections of the three Institutions sixty-four students from Universities in Belgium spent seven days in London at Easter, visiting electrical and engineering establishments, in return for hospitality extended to I.E.E. students who visited Belgium last summer. I.E.E. students are to tour Switzerland in August, one party of forty being drawn from all sections in proportion to their total memberships.



I.M.E.A. Convention

Final Proceedings at Eastbourne

The final Convention of the Incorporated Municipal Electrical Association concluded at Eastbourne last week with the handing over of the torch (symbolized by an electric flambeau) to Lord Citrine, chairman of the British Electricity Authority, by Mr. J. Eccles, the last president of the Association. We take up the account of the proceedings at the Convention begun in our last issue with a report on Mr. R. C. Golding's paper on "Reorganization for Efficiency on a Regional Basis." This is followed by notes on the speeches at the E.A.W. luncheon, the annual dinner and the final session.

Reorganization for Efficiency

THE paper on this subject by Mr. R. C. Golding was reviewed in our last issue. The discussion was opened by Mr. E. R. Wilkinson (commercial manager, B.E.A.) who thought the author was too sweeping in his statement that functional costing was practically non-existent in the British electricity supply industry. It was true that it was far from adequate and from being as codified as it should be. As the result of the Electricity Act, 1926, a codified practice of costing had been developed and applied throughout the industry to selected stations and it was an example to the world of a unified code of practice for generation. On the distribution side he was not so sure that there was any really unified practice. He had heard recently of undertakings for which no such accounts had been made up for three years and of others which could not give any indication of the revenue received from the sale of electricity at any particular tariff. At the same time there were many undertakings which had a good functional basis of costing. The 1947 Act required the industry to produce a standard basis of costing for distribution while that for generation would have to be revised in the light of the new circumstances.

Mr. F. J. Elliott (Wolverhampton) said that in using the capital expenditure, kWh sold and number of consumers as a means of assessing the efficiency of an undertaking for comparison with others, the author had ignored two most important factors, viz., types of supply and consumer density. The kWh sold per £1 of capital expenditure and the kWh sold per consumer would be greater for power than for lighting and domestic supplies. He quoted figures to support this view. Applying the author's "solco" factor, the power group showed an efficiency more than four times greater than that of the lighting and domestic

Mr. Golding reading his paper

group. On the other hand the lighting and domestic group sold twice the number of kWh per consumer for lighting and domestic purposes at a revenue per kWh of one-third less than the power group obtained for similar supplies. Therefore, using as a criterion the kWh per consumer and average revenue obtained per kWh, the power group showed a greater efficiency for power supplies, and the lighting and domestic group for its class of supply.

He also advocated block tariffs for domestic supply but for a reason not given in the paper, viz, that the increase in the cost of fuel had materially altered the build-up of the cost of electricity at consumers' terminals and in such a manner as to facilitate the desired simplification of tariffs, inasmuch as a greater proportion of the total cost of supply was now directly governed by consumption.

Councillor W. Hebden (Shoreditch) said he was very worried about the spirit of the industry, particularly since he had had the opportunity of talking to engineers during the conference. In the past the incentive always existed for an engineer to do his very best for his undertaking in the hope of getting a bigger post in a larger one. Under nationalization there was a great fear that the spirit to do the very best for the particular undertaking would no longer exist. Every effort must be made by the new Authority to foster the spirit that had always existed. He hoped there would not be too much standardization because if, for example, there was to be only one type of switchgear and one type of cable, the industry and the country must suffer.

Mr. R. H. Rawll (Shoreditch) considered the training of personnel for the industry a matter of vital importance. When men experienced in management retired in a few years, there would be none to take their places unless special steps were taken to educate younger men in management. The aim must be to produce leaders, he said he preferred that word to administrators, because the latter conjured up the idea of men sitting at desks all day. One of the biggest bugbears in large organizations was that the men at the top had no time to see what was going on down below because they were so immersed in matters of major importance. He urged that in the new organization the elements of training for management must be inherent, not merely something which might be superimposed on it at a later date.

Alderman C. H. Wilkinson (Grimsby) after paying a high tribute to the work of municipal electrical engineers in the past said he would like to see a school established for the training of personnel. He did not see why large houses should be bought for the staffs of the nationalized industry. Under the new organization the mistake should not be made that many local authorities had made in the past of almost completely separating the accountancy from the technical side, because it resulted in loss of personal touch with the consumer. The accounts should be paid in the showrooms where complaints or suggestions could be dealt with at once.

Group of past-presidents: Messrs. F. Forrest, F. Newey, J. K. Brydges, C. G. Morley New, W. J. Bache and W. C. P. Tapper

Mr. R. H. Coates (Portsmouth) said he knew of one small undertaking which had been pulling in cables by capstan, along the lines suggested by the author, for twenty years. Also, one undertaking in Yorkshire had had an excellent functional costing system for many years and, although it called for a great deal of paper and detailed working out, the cost was only a few thousand pounds a year which was not excessive for the results obtained.

Mr. C. Garfield Richards (Port Talbot) thought that the two-part tariff was more adaptable to the conditions of hire and hire-purchase than block tariffs. As the halcyon days of spending were coming to an end, there would be a greater demand for hire and hire-purchase facilities.

The President said that costing must be carried right down to the point where the responsibility could be pinned on to one man, if it were to be of any value, and the cost of a costing system must not be greater than the savings achieved. Figures were only a means to an end and they

must not be overdone at the expense of the human relationships within the industry. He was not decrying costing, but it was not conducive to the best results if the engineer knew someone was "vetting" and analysing his efforts in terms of figures and ceremonial which would rebound, perhaps, to his discredit after he had done his best.

At the E.A.W. luncheon: Lord Citrine, Miss Richards, Mr. Eccles, the Dowager Lady Swaythling, the Mayor of Eastbourne and Mrs. Eccles

Mr. Golding, in a brief reply, reminded his critics that he had said that functional costing was "practically" non-existent in distribution, because he knew there were undertakings which were doing it in an excellent manner. As to the human element in introducing such systems, he said he had never met with any large number of people who had desired to obstruct. On the whole there had been willing co-operation once the purpose was clearly explained.

Women's Luncheon

THE Dowager Lady Swaythling, president of the Electrical Association for Women, was in excellent form at the women's luncheon held at the Grand Hotel on 10th June, when she proposed the toast "Our Friends—Old and New." She recalled that she was the first woman speaker at an I.M.E.A. Convention several years ago and said that in future they would welcome their engineer friends in new guise. Lady Swaythling told several stories which vastly amused the company.

In his response to the toast Mr. J. Eccles suggested that a good alternative title would have been "Hims Ancient and Modern." He expressed his admiration of the way in which women had played their part during the last nine trying years. The Association must continue to train women to demand full electrical service and arrange meetings to educate people in the best use of electricity to secure load spreading in the home to help us over our temporary difficulties. Under the guidance of Lady Swaythling and Dame Caroline Haslett the E.A.W. should go from strength to strength.

Alderman Sir William Walker, Mrs. Peattie, Mrs. Lewis and Lt. Col. E. H. E. Woodward

Annual Dinner

ABOUT 400 members and guests attended the dinner at the Grand Hotel on 10th June. The President was in the chair and the guests of honour were the Rt. Hon. Herbert Morrison, M.P. (Lord President of the Council) and Lord Citrine.

Mr. Morrison, proposing the toast of "The Electricity Supply Service," apologized for the absence of Mr. Gaitskell (Minister of Fuel and Power) who had to attend the second reading of the Gas Bill. Mr. Morrison said that from the first, public ownership of electricity supply was contemplated. Local authorities had played an important part in the technical and commercial development of the industry. After recalling his own experience of municipal electricity supply when he was a member of the Hackney Borough Council, and paying a tribute to the work of Mr. L. L. Robinson, the engineer, he said it reflected the greatest credit on the wide outlook of local authorities, and of the I.M.E.A., in particular that they had played their part in moulding the British Electricity Authority and the Area Boards. The industry must be so organized at all levels that inventiveness and fertility of idea had the fullest play. The organization must be as big as, but no bigger than, was essential.

While it was necessary that electricity should be as cheap as possible, it was also essential to get the right tariff structure, designed to secure

that the available electricity was used to the best advantage in the national interest. He hoped there would be a strong competitive element in the relations between the gas and electricity supply industries, but it must be on terms which held the balance evenly between the two industries. There should be no question of the electricity supply industry using its virtual

Mr. Herbert Morrison speaking at the annual dinner

monopoly of lighting to make higher charges in that field with a view to subsidizing competition in other directions.

Speaking of relations with the public, Mr. Morrison hoped the Area Boards would show that they were alive, receptive and friendly.

Commenting on the fact that I.M.E.A. was passing, he said that he believed that the technique and the service which the municipalities had built up on so firm a foundation—but which had now outgrown its municipal boundaries—would come to full maturity under the new order. After paying a tribute to the Central Electricity Board, Mr. Morrison said the Government was fully aware of the difficulties of the British Electricity Authority in respect of shortage of plant capacity and the revisions which it had been necessary to make in the programmes of the Central Board. The restrictions that it had been necessary to impose had only been decided upon after a most exhaustive examination of the position in the light of the general economic circumstances of the country. There were many competitive claims and he regretted the position. The Government would do its best, although the industry would not be able to get all it wanted.

Lord Citrine, responding to the toast, said it was a matter for great satisfaction that the nationalized electricity supply industry was not to be administered by a Government Department for nothing could have been worse or more stifling to freedom of expression and initiative. The nationalized industries were being administered by men of capacity and ability and with a wide knowledge of the particular industry, a fact which had not gone down very well in the Labour movement which thought it had a prior claim to the administration of these industries, suspecting that others would not go into them with the integrity, impartiality and efficiency that was needed.

He preferred to use the term "British Electricity Service"; he did not like "British Electricity Authority." The Service consisted of an amalgamation of 139 companies and 362 public authorities. The chairman of a London company had told him it had taken five years to achieve the anticipated economies from an amalgamation of six companies; this indicated what an immense task was involved in the reorganization of the whole electricity supply industry. There were three major interests; men, material and machines, and there was a shortage of everything. Materials were outside the control of the new organization but unless they obtained more materials and machines, it would not be possible to provide that cheap and abundant supply of electricity that was so much talked about when the 1947 Act was before Parliament. The programme of the B.E.A. was well behind through no fault of their own nor of the manufacturers who could not get the materials. He did not look forward with any equanimity to the programme being still further cut and unless further plant was forthcoming we were bound to be in for a period—years not months—of extensive load shedding and even breakdowns.

Lord Citrine concluded with an appreciation of the work that had been done by municipal electricity committees over a very long period and expressed the hope that the standard of service of the new organization would be even higher.

At the annual dinner: Councillor J. Selwyn-Jones, Mr. J. W. Simpson, Mrs. Pickles, Mr. J. S. Pickles, Mr. Herbert Morrison, Mr. Eccles, the Mayor of Eastbourne, Lord and Lady Citrine, Mrs. Eccles and Miss Richards

Councillor J. Selwyn-Jones (Newton-le-Willows) proposing "The Guests" said he was a little disturbed at the losses being suffered by municipal government. However, he assured the Government that those who had worked for so many years in municipal electricity supply would give the new order their fullest support.

The consumer of electricity was the ratepayer and he continually looked to the public representative for the rectification of grievances or alleged grievances. Therefore, there should be some direct contact between the local authority and the British Electricity Authority, and he made a special plea that when the Consumers' Consultative Councils were formed they should consist, as far as possible, of public representatives.

Mr. Percy Good (President, Institution of Electrical Engineers) responding to the toast, said the I.E.E. had played a great part in securing the effective training of the technologists who were so essential in an industry so highly scientific as the electricity supply industry. But this could not alone have brought about the enormous strides made during the last fifty years. There had been co-operation with other organizations, such as the I.M.E.A. which spoke collectively for their own particular sections of industry.

Trade associations had recently come under some general criticism which was entirely unreasonable. They had enabled the electrical industry to bring many benefits to the community. It was said that "He who pays the piper calls the tune" but to apply that to the electrical industry would be a disastrous policy. He hoped it would be recognized by the new authorities which would be purchasing large quantities of materials and goods. Far better results would be obtained by co-operation with the manufacturers through joint committees, for those who supplied the materials were just as important as those who bought them. The I.M.E.A. had co-operated with the manufacturers in this way for many years.

Mr. B. H. Leeson (Director, British Electrical and Allied Manufacturers' Association), who also responded, emphasized the need for the work of the I.M.E.A. to live on. The work that had been done by the I.M.E.A., B.E.A.M.A. Joint Committee, would live on in another committee with the British Electricity Authority. The manufacturer had to supply equipment not only for the generation of electricity but also to other industries to produce goods for export; there was not only the electrification of this country but also the electrification of the Empire and, as far as we could, the electrification of the world. Whatever might regulate our collective enterprise in the future he suggested that individual enterprise would have to play as important a part as it had done in the past.

Dancing at the Winter Garden after the Annual Dinner

At the conclusion of the dinner speeches there was a little ceremony in which Mr. G. P. Dennis handed over to Lord Citrine the trophy he presented some twenty years ago to the I.M.E.A., for a golfing competition each year, the proceeds of which go to the I.E.E. Benevolent Fund. Mr. Dennis said that I.M.E.A. Convention competitions had raised a total of £2,777 for this purpose, whilst the grand total, including the results of competitions at Manchester was £4,678.

Handing-Over Ceremony

OPENING the final session of the Convention, Mr. Eccles welcomed the presence on the platform of a number of past-presidents —Messrs. S. T. Allen, W. J. Bache, J. K. Brydges, A. C. Cramb, F. Forrest, E. E. Hoadley, H. C. Lamb, J. Mould, C. G. Morley New, F. Newey, J. S. Pickles, W. C. P. Tapper, J. W. J. Townley and Sir William Walker. These names, Mr. Eccles said, epitomized the history of the electricity supply industry. At least two of them, Messrs. Hoadley and Tapper were present at first Convention in 1895.

The President went on to say that in a normal Convention this would have been the occasion

The Council of the Incorporated Municipal Electrical Association — a farewell picture

of the annual general meeting of the Association, when new members of Council and a new president would have been installed. But the Association ceased to have a corporate existence when on 18th March last they decided to pass into voluntary liquidation and this Convention was arranged with the active and generous co-operation and support of the British Electricity Authority to bridge the gap until the new organizations could see the future more clearly.

This conference had been meeting annually—except in wartime—for fifty-two years. During that time they had seen the electricity supply industry grow from nothing to the massive factor it had now become in our national life.

Let no one think that because the industry had been successful its growth had been automatic or its development easy. They had had to fight every inch of the way and if it was to continue to be successful the fight must go on. They must strive for technical excellence; provide a service which for value and courtesy is superior to any alternative that was or might become available; educate the public to share their beliefs and to appreciate the amenities that a full electrical service could bring; provide good working conditions; and not be afraid of competition in any field.

All this could, of course, go on *in vacuo* with each of the new organizations making progress in isolation. How much better if all were to work together, exchanging ideas and deriving that inspiration which flowed from contact with other progressive minds. And how much better still if at intervals—annually perhaps—all could meet on common ground—the manufacturers, the electricity boards, their staffs, and representatives of the consumers—to discuss and find solutions for their separate and their common problems, and learn to understand each other better.

The Industry's Key Position

Their industry held a key position in the plans for national recovery. By a wise and balanced approach to their problems they could radiate benefits far beyond the narrow confines of power supply and set a pattern in technical efficiency and human relationships for every industry to follow. It was because these momentous issues were at stake that they welcomed Lord Citrine in his capacity as chairman of the British Electricity Authority. They welcomed him as a man of vision, of great integrity, and great capacity for work, and endowed in rich measure with an understanding of human nature and human relationships.

As a symbol of the transfer of responsibility for the wellbeing of the industry to the B.E.A. and the Area Boards he (Mr. Eccles) had been charged to hand on to Lord Citrine an illuminated baton-torch " to light his path and guide his feet through all the perplexities of the future." He expressed the hope that Lord Citrine would be able to provide an abundance

of electricity soon, and build up such a blend of technical excellence, happy human relationships within the industry and service to the consumer as would bring to the new organizations credit and renown, and see this country far along the road of industrial prosperity.

Lord Citrine, in thanking Mr. Eccles, said that he was very conscious of his responsibility but happy in the knowledge that it was shared by a group of colleagues who comprised men of understanding and a woman of unique capacity and character (Dame Caroline Haslett). He had not had a single anxiety on personal grounds although there had been anxieties in other directions—but they, too, were shared by his colleagues.

Referring to the work of the Organizing Committee set up to plan the form and structure of the new organization, Lord Citrine said that planning, other than purely physical planning, was a most difficult matter for it concerned human beings. Very little modification of the Committee's proposals had been necessary.

Maximum Decentralization

Two simple principles ran through all that they were doing. They had tried to leave things undisturbed wherever they could and to decentralize to the maximum possible extent. They aimed at maintaining confidence in the industry and they had met in an informal way all the associations in the electrical industry to demonstrate their honesty and fairness of purpose and he believed that they had succeeded.

The Area Boards were autonomous separate entities composed of able and experienced people of a predominantly electrical character. He had had a voice in these appointments but the Minister of Fuel and Power was responsible for them.

He conceived it to be the duty of the new organization to reflect communal needs and seek communal well-being. It must be a personal organization and he wanted to know the actual people doing the jobs not merely as divisional controllers, sub-area managers or district engineers.

The actual transfer of responsibility had been remarkably smooth and the prophets had been confounded. Most of the work had been done as part-time service by men who still had their existing jobs to do. There had been criticism of the Boards' acquiring large premises, but they had to have proper accommodation for their staffs. Far from being ashamed of this he hoped that eventually they would have in London a building of the finest possible character symbolizing the great service which they administered.

Consultation was the principle throughout the organization. They hoped to make the Consultative Councils their friends by treating them with respect and confidence. He had been greatly impressed with the value of the Convention in bringing together not only men in the electricity supply industry but all connected with it in any way. He was convinced of the necessity of continuing it with the necessary adjustments. In spite of adverse views on the subject, no large-scale body could be operated without conferences; the bigger the organization the greater the need. Conference was a healthy antidote to bureaucracy.

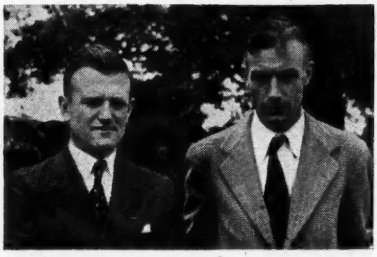
The I.M.E.A. Convention had played a valuable part in building up the heritage taken over by the B.E.A. and it had been decided that

The President hands over the symbolic torch to Lord Citrine

some sort of conference would be necessary in the future. Decentralization called for something of the sort to ensure co-ordination. It had therefore been proposed that next year the British Electricity Authority should hold a conference in which representatives of the Consultative Councils would take part. This would concern itself with the internal problems of the nationalized organization. Consideration had been given to the desirability of associating with this conference a national convention and the matter had been discussed with the Association of Consulting Engineers, the Electrical Research Association, the British Electrical and Allied Manufacturers' Association, the Electrical Development Association, the Cable Makers' Association, the Electric Lamp Manufacturers' Association, the Electrical Association for Women, the Electrical Contractors' Association, the Electrical Wholesalers' Federation, the Employees' National Committee, the Institution of Electrical Engineers and the National Register of Electrical Installation Contractors, who had been unanimously of the opinion that a National Convention should be held next year.

This would probably be called the British

Electric Power Convention and its aims would be similar to those of the I.M.E.A. It was hoped to organize an exhibition and the social functions which had fostered and maintained friendships among those in the industry. There would be a convening committee consisting of two representatives of each of the Associations mentioned, and a sub-committee had been appointed to draw up arrangements. It was hoped that the North of Scotland Board and the Northern Ireland undertakings would participate. Both conferences should be held



Mr. N. Boydell (former borough electrical engineer, Eastbourne) and Mr. Norman Elliott (chairman, South Eastern Electricity Board)

in the same week, with probably two days for the B.E.A. Conference and three or four days for the National Convention. The future of the Convention would depend upon experience gained at the 1949 function, but he was convinced that it would be continued. So far there had been no firm decision but he had no doubt that the proposals would be ratified.

Reverting to the British Electricity Authority itself, Lord Citrine said that they were on very good terms with the employees. Mr. Bussey and Sir William Walker were most experienced in these matters and their invaluable advice was leading to the establishment of harmonious relations. There would probably be four organizations for the various grades of employees for the discussion of salaries and wages and conditions. But the Authority also had the duty of consulting the employees upon matters affecting the operation of the system, although that did not mean that the employees could interfere with the executives' powers of decision. For this purpose they hoped to form a single Council representing the four organizations, the B.E.A., Area Boards and Divisions.

In their desire to keep the public informed they were encountering difficulties. For instance, the poster "Mummy Forgot to Switch it Off" had raised grave psychological questions and had even been the subject of questions in the House of Commons. In fact the poster was one which had been acquired free of charge from the Electrical Development Association and had been suitably modified.

Lord Citrine paid a tribute to all those who had been associated for so long with the I.M.E.A. Conventions. He asked them to be charitable to him and believe that he sought no public prominence; he merely desired to serve the community. In the Authority they steered clear of politics although outside there were attempts to make political capital out of them.

He welcomed the award of the O.B.E. to the secretary, Mr. J. W. Simpson, and had taken steps to see that his invaluable services would not be lost to them. He expected them to see Mr. Simpson as active as ever at future Conventions.

There was a poignancy in the parting of parents and their grown-up children, but this was coupled with a sense of pride. This was the case with the I.M.E.A. Change was inevitable, but those who had built up the industry would see their example followed closely by the new authorities. Service to the community was their ideal and the power to do good was the greatest thing anybody could possess. He was proud to be associated with Mr. Eccles and his colleagues and was determined to carry on the traditions they had so worthily established. He then presented Mr. Eccles with the past-president's badge.

After Mr. Eccles had responded briefly, Alderman G. B. Brooks, O.B.E. (hon. treasurer, I.M.E.A.), proposed a vote of thanks to Lord Citrine and assured him of the fullest support. He also made a graceful reference to Lady Citrine. In seconding the motion, Mr. E. E. Hoadley (hon. secretary) said that as a very young man he was present at the first Convention and now he was at the funeral oration. He had no doubt that the future of the industry was in safe hands. Lord Citrine had the two saving graces of humanity and humour.

Lord Citrine acknowledged the vote of thanks and then Mr. Eccles expressed thanks to all who had contributed to the success of the Convention. This was followed by a vote of thanks to Mr. Eccles proposed by Alderman Sir William Walker and seconded by Councillor J. Selwyn-Jones (vice-president, I.M.E.A.). The proceedings were thus brought to an end.

Next Week's Events

Monday, 21st June

LONDON.—St. Ermin's Hotel, Caxton Street, S.W.1, 6.30 p.m. Association of Supervising Electrical Engineers (Central London Branch). "The Sales Engineer in Industry," by A. N. D. Kerr.

BLOXWICH.—Bloxwich Golf Club, 2 p.m. Birmingham Electric Club. Golf competition.

Tuesday, 22nd June

LONDON.—Savoy Place, W.C.2. Institution of Electrical Engineers. Annual Conversazione.

Saturday, 26th June

PAIGNTON AND DARTMOUTH.—I.E.E. South-Western Sub-Centre. Summer meeting including visit to the Royal Naval College, Dartmouth.

The Coal Position

Increased Consumption for Electricity

AN appeal for economy in the use of electricity and gas was made by Mr. H. Gaitskell, Minister of Fuel and Power, in a review of the coal position at a Press conference held last week. Referring to inland consumption, Mr. Gaitskell said that they were putting total inland requirements, both for current consumption and stockbuilding, at 93·16 million tons for the six summer months, as compared with 94·09 million tons, either consumed or put in stock, in the corresponding twenty-six weeks of 1947. Consumption in the first four weeks amounted to 13·77 million tons, which was 4·6 per cent more than the amount consumed in the corresponding weeks of 1947.

He wished to draw particular attention to the increase in the coal consumed by electricity stations and gas works in the first five weeks of the summer. This was above expectation by 6·4 per cent and 4·3 per cent respectively, and compared with a year ago, electricity sent out for public supply and gas similarly available (including supplies from coke ovens) was 18·6 per cent and 9·7 per cent higher respectively. The last two weeks had been worst of all. Consumption of gas had been 18·5 per cent and 19·7 per cent and that of electricity 40·4 per cent and 31 per cent above last year. It was true that the weather had been colder so far this summer, but this was nothing like enough to account for these increases in electricity consumption.

Although our general coal position was much stronger than it was a year ago, we could not, as a country, afford to step up consumption so sharply for we had now to export very substantial quantities. Moreover, a good deal of the additional electricity consumption occurred during the periods of peak demand, and if it continued would lead to drastic load shedding next winter.

Electronic Methods

Industrial Applications

THE manner in which the electron concept had provided satisfactory explanations of many phenomena in physics and chemistry was explained by Sir Edward Appleton (D.S.I.R.) when he delivered the second Dunn Memorial Lecture to the Society of the Chemical Industry in Newcastle-upon-Tyne last week.

After indicating some of the theoretical possibilities, Sir Edward referred to practical applications of electronic methods in industry and mentioned fluorescent illumination as an example. He said it had been estimated that if all the artificial lighting in this country were carried out with this type of lamp two million tons of coal a year might be saved, which would enable the 'generating capacity of two power stations of the size of that at Battersea to be redeployed.

The Department of Scientific and Industrial Research, in conjunction with the Ministry of Supply and a number of other research organizations, had recently been paying a good deal of attention to possible industrial applications of electronic methods. An advisory panel under the chairmanship of Sir Charles Darwin (director, N.P.L.) had been formed to endeavour to bring together research workers as well as the makers and users of such equipment. In addition groups had been formed at the T.R.E. and the N.P.L. to examine industrial problems at first hand with a view to suggesting how they might be solved by electronic means.

Aluminium Busbar Design

Ratings from 3,000 to 5,000 A

LONG three-phase busbars for low voltages advocated by the Aluminum Company of America are made of extruded sections arranged in triangular formation with open ends for ventilation.

Each conductor is bent inwards to allow close spacing for low reactance, which arrangement enables busbars to be designed for ratings from 2,000 to 5,000 A. In a typical 3,000-A design the conductors are 12½ in. (317 mm) wide and $\frac{11}{32}$ in. (8·7 mm) thick; 40 ft. (12·2 m) lengths have been used, but greater lengths can be made. Each conductor has a cross sectional area of 5·16 sq in. (33·3 cm) and a perimeter of 33·86 in. (86 cm); the conductor spacing is 1 in. On the edge of each conductor is a fin to aid heat dissipation, to increase stiffness and to distribute the cross-sectional area efficiently in respect of the skin effect. Modifications in shape are made practical by the extrusion method of manufacture.

The insulators are placed at 4, 2 or 1 ft intervals according to the short-circuit capacity of the system. According to *Electrical Engineering*, preliminary tests have indicated that 1 ft (0·3 m) spacing will withstand a short circuit of about 60,000 A r.m.s.; 2 ft (0·6 m) about 40,000 A and 4 ft (1·2 m) about 30,000 A. Neoprene washers are used to relieve the peak short-circuit stresses by allowing the conductors to move slightly. In a flexible system part of the short-circuit force is expended in overcoming the inertia of the conductor and in doing work on the flexible support. This movement produces a damping effect which reduces the peak force on the insulator bolt.

After erection, the conductor sections are spliced with short aluminium bars and four ½-in. steel bolts with spring washers are used for each splice bar. Because standard nuts on these bolts would reduce the clearance distance between phases and it is impracticable to tap the conductor, special steel spline nuts are pulled into the conductor by the bolts and then remain part of it.

NEW BOOKS

Research at Eindhoven and Harvard

Research in Holland. By J. L. Snoek. Pp. 136; figs. 52. Cleaver-Hume Press, Ltd., 42A, South Audley Street, London, W.1. Price 13s. 6d.

This book is of particular interest in so far as it indicates the lines of thought and development in magnetic theory in a research school cut off, by force of circumstances, from any other research organization. The book is one of a series on " Research in Holland " and emanates from the Philips laboratories at Eindhoven. It is divided into three sections, the first of which deals with the phenomena of ferromagnetic hysteresis and initial magnetization. The ferromagnetic oxides are considered (ferroxcube) and also the effect of cold rolling on the properties of nickel iron (fernicube).

The second section is devoted to the dynamics of ferromagnetism, which is concerned with eddy-current problems, skin effects, after effects, and theories are put forward to accommodate and co-ordinate the observed phenomena.

The third section on the development of magnetic materials, is largely devoted to the ferrites (ferroxcube) in which subject the Philips laboratory is pre-eminent.—W.F.R.

Very High-Frequency Techniques. By Radio Research Laboratory Staff, Harvard University. 2 Vols.; pp. 1057; figs. and index. McGraw-Hill Co. Price in U.K. 84s.

These two volumes, which incidentally are not sold separately, are essentially a chronicle of the work carried out during the war by the Radio Research Laboratory at Harvard University, which was established to develop counter measures against enemy radar. The basic requirement then was for equipment to cover the widest possible ranges. Thus the central theme of the books is how to extend the range of known components for frequencies between approximately 100 and 10,000 Mc/s.

Considerable space is devoted to the possibilities and limitations of a large variety of aerials and interesting use is made of circle diagram methods to design wide-band matching and compensating networks for them. The design of transmitting valves and circuits is considered, together with methods of modulation. The latter are not of wide interest, since the main requirement for jamming enemy transmissions is to spread the modulation randomly over as wide a frequency band as possible. In the case of receivers the emphasis is again on wide range and many ingenious tuning and ganging circuits are described. There is an interesting chapter on display and interpretation of received signals, but surprisingly little detail is given on panoramic presentation. The chapter on power-measuring devices is especially comprehensive.

The treatment throughout is essentially practical; rather more so than one might expect in a book of this kind, with many illustrations of finalized equipments. Theory is all of an elementary nature. In view of the fact that the books are a combined effort of some forty authors the treatment is of a commendably uniform level, but some of the words coined fall harshly on English ears. Surely a more euphonious term than *balun* for a balance-to-unbalance transformer could have been invented. In a different class, but equally unpleasing, are the ponderous terms *effectivity* and *collectivity* used as measures of aerial performance.

Now that radar wavelengths and components are being adapted to other uses, the extension of the narrow operating bands to the widest possible limits is clearly an economic necessity, and so the information in these books will be of value to all engaged in the design of such equipment and in search of new ideas.—H.R.L.L.

Electronic Devices. By H. A. Miller, A.M.I.E.E. Pp. 100; figs. 71; index. Sir Isaac Pitman & Sons, Ltd., 39, Parker Street, London, W.C.2. Price 12s. 6d.

This is another little book describing some of the many electronic devices that are widely used to-day. The principal subjects dealt with are receiving and transmitting valves, gas-filled relays, photo-electric cells, cathode-ray tubes and X-ray tubes. The book is intended for students, or for electrical engineers who are not specialists in this field; both may well find the discussion somewhat elementary and the very brief treatment of the fundamental physics and of the methods of operation of the various devices inadequate. On the other hand the applications are dealt with in a much more satisfactory manner, and many readers will find these of interest. Quite full descriptions of a number of commercial valves and tubes and their characteristics are given; these, in places, seem somewhat too detailed for what is intended to be primarily a general treatment.

The book is well produced, but the price seems high.—V.J.F.

Books Received

Television. By M. G. Scroggie (2nd Edition). Pp. 77; figs. 28; index. Blackie & Son, Ltd., 66, Chandos Place, W.C.2. Price 6s.

Electricity in the Home. By H. P. Smith. Pp. 132; figs. 55; index. Crosby Lockwood & Son, Ltd., 20, Tudor Street, E.C.4. Price 5s.

The Trader Handbook: A Legal, Technical and Buying Guide for the Motor, Motor Cycle and Cycle Trades. (42nd Edition.) Pp. 412. The Trader Publishing Co., Ltd., Dorset House, Stamford Street, S.E.1. Price 12s. 6d. post free (overseas 14s. 6d.)

Power-System Estimating

Obtaining Data Rapidly from Load Curves

By E. J. Wood,
B.Sc., Graduate I.E.E.

IN order to plan and operate a power station or power system, it is necessary to predict the magnitude and characteristics of the future service requirements. Various load curves to be described give all the essential information for load estimation in a readily accessible and easily usable form and save much involved calculation.

The usual curve for showing load changes is the daily load curve, in which time is plotted along the horizontal axis and load along the vertical axis. Such a curve is of use mainly to the system operator in scheduling units for generation and as the basis for constructing the other curves. The daily load curve shown in Fig. 1 is plotted from the average loads over every hour of the day and is consequently a stepped curve.

From the daily load curve, it is possible to pick out and compare peak loads very readily and comparison is made even easier by cutting out thick cards to the shape of the load curves and filing them in chronological order in a box. The variation of peak loads during the year is then easily seen and any abnormalities noticed immediately.

Any point on the load-duration curve gives the number of hours that the load exceeded a certain value. In Fig. 2, the load-duration curve for 24 hours is plotted by arranging the load ordinates from Fig. 1 in order of decreasing values. An alternative construction is to step off lengths such as $(a_1 + a_2)$ obtained from the daily load curve along the same horizontal line.

A yearly load-duration curve is produced by adding together all the hours in a year when loads in excess of a certain value occurred. In practice the load values must be collected into groups covering a small portion of the load range and the number of hours summated in each group. The loads in a particular group are then plotted at the minimum value of the group. The area under both the daily load curve and the load-duration curve measures the total energy output, since in each case the horizontal axis represents time and the vertical axis load.

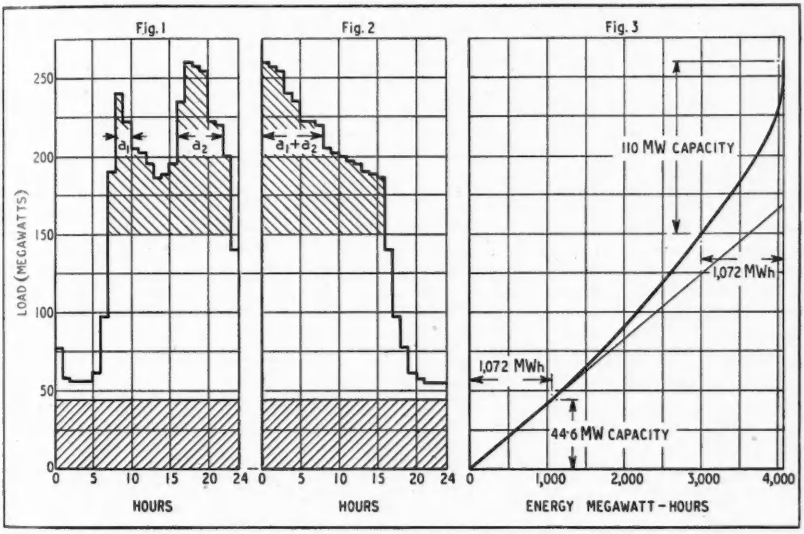


Fig. 1.—Daily load curve. **Fig. 2.—Load-duration curve** **Fig. 3.—Load-energy curve**

The load-energy curve can be constructed by drawing horizontal lines across the load-duration curve at suitable intervals and finding the energy represented by the area between each horizontal line and the base of the graph, which is then plotted at the corresponding point on the load-energy curve. Table 1 gives the derivation of data for plotting the load-energy curve shown in Fig. 3. The energy increments given in column 4 of Table I can be regarded as the increase in area under each successive step of the load duration curve starting from the minimum load.

Any point on the load-energy curve gives the total energy supplied at loads below a certain value. A valuable property of the curve is that a straight line connecting the origin and the energy at minimum load when extended to the extreme right-hand ordinate gives the average load, or if the load scale is calibrated as a percentage of the maximum load, the load factor is given directly. The average load for the load-energy curve shown in Fig. 3 is 170 MW, and the load factor =

$$\frac{170}{260} \times 100 = 65{\cdot}4 \text{ per cent.}$$

Estimating Output Capacity

As an example illustrating the use of such curves, assume that a possible hydro-electric site, with a stream flow of 3,100 cusecs and an available head of 200 ft, is being investigated. It is required to determine the plant capacity for operation on peak or base load, assuming complete utilization of the flow and an overall plant efficiency of 85 per cent. The energy available per day from the plant is 1,072 MWh. For the peak-load case, step back 1,072 MWh from the extreme

TABLE I

(1) Load	(2) Load Increments	(3) Hours	(4) Energy Increments Col. 2 x 3	(5) Cumulative Energy
MW	MW		MWh	MWh
56	56	24	1,344	1,344
57	1	21	21	1,365
62	5	20	100	1,465
76	14	19	266	1,731
98	22	18	396	2,127
140	42	17	714	2,841
186	46	16	736	3,577
188	2	15	30	3,607
190	2	14	28	3,635
195	5	13	65	3,700
196	1	12	12	3,712
200	4	11	44	3,756
202	2	10	20	3,776
205	3	9	27	3,803
220	15	8	120	3,923
222	2	7	14	3,937
235	13	5	65	4,002
240	5	4	20	4,022
254	14	3	42	4,064
256	2	2	4	4,068
260	4	1	4	4,072

right-hand ordinate on the load-energy curve. This includes all peak loads from 260 MW to 150 MW, so that the plant capacity required is 110 MW.

In the base-load case, stepping off 1,072 MWh from the origin of the load-energy curve includes all base loads up to 44·6 MW, which is therefore the plant capacity required. The hatched areas in Fig. 1 and Fig. 2 give

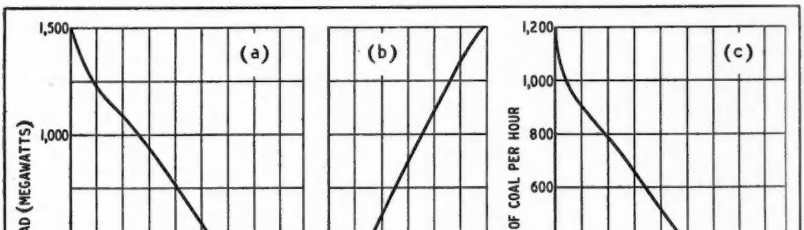


Fig. 4.—Prediction of annual coal consumption
(a) Coal consumption-duration curve. (b) Load-duration curve. (c) Rate of consumption curve

the daily load curves and load-duration curves of a power plant to deliver 1,072 MWh working on either peak or base load. It will be seen that on base load a power plant of 44·6 MW capacity would provide 1,072 MWh if it is run for the whole twenty-four hours at full load, giving a rectangular load-duration curve. As a peak-load station of 110 MW capacity, however, no generation would be needed for eight hours of the day. A plant operating at any part of the load curves can be dealt with in the same manner.

For short-term estimating, the load curves can be assumed to keep the same shape and the load-duration and load-energy curves plotted on a percentage basis, using recent actual data. A trend curve is used for predicting future peak loads and the percentage load curves then used for deriving the other quantities.

Fig. 4 gives a practical example of the use of a load-duration curve in predicting future coal consumption of an all-steam-station system. The estimated annual load-duration curve shown is modified by applying a rate-of-consumption curve (giving the tons of coal consumed per hour at every load) to derive an annual coal consumption-duration curve.

The annual load-duration curve is drawn in the manner previously described and the curve of tons of coal consumed per hour at every load is compiled from the previous year's records. The area under this curve represents the coal to be consumed during the year, which from Fig. 4 gives 4·39 million tons.

Frequency Monitor

Detection of Small Changes

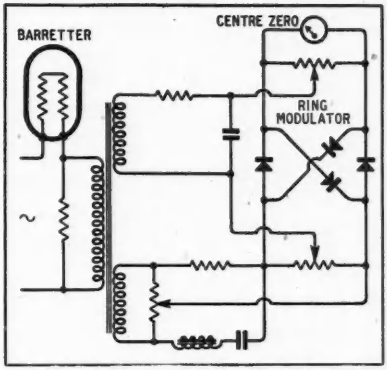
AN instrument has recently been developed by British Physical Laboratories, Houseboat Works, Radlett, Herts., which will detect small changes in any nominal frequency. It is primarily intended to monitor the mains supply frequency and so is calculated to indicate 50 c/s ± 2·5 c/s with an overall accuracy maintained to within a limit of 0·1 per cent.

The principle of operation depends essentially upon a ring modulator, the output of which is connected to a centre zero instrument. The supply voltage, the frequency of which is under observation, is fed into the primary of the transformer through a voltage stabilizing network. This transformer has two secondary windings. The lower winding is connected to a resistance which is in series with a capacitance and inductance which resonate at the supply frequency. A voltage, the phase angle and magnitude of which varies with the frequency under examination, is tapped off and fed into the input of the modulator. The circuit is so arranged that the voltage impressed upon the carrier terminals from the upper winding is exactly in quadrature with the modulator input at correct supply frequency.

Changes in supply frequency cause phase changes in the modulator input which results in a d.c. output. The direction of the output current, and hence the direction of deflection of the meter, will depend upon whether the frequency is increased or decreased. This follows from the fact that an increase of frequency produces a component of the input voltage to the modulator which is in phase with the carrier. The converse naturally applies for a decrease in frequency.

The sensitivity of the circuit depends primarily on the " Q " of the resonant circuit. Since this is reduced by the presence of the series resistance it is necessary to make the inherent " Q " of the inductance as high as possible. A circuit " Q " of 3 or 4 at 50 c/s is found to give ample sensitivity to produce full-scale deflection on a 250-0-250 microammeter with an input of 20 V r.m.s.

With this instrument a supply voltage change of 10 per cent causes an error of 0·025 c/s at the extreme ends on the scale i.e., at 47·5 or 52·5 c/s. For frequency deviations of ± 2·5 c/s the scale is sensibly linear and a voltage change of 10 per cent causes an error of 0·025 c/s at the extreme ends of the scale, i.e., at 47·5 or 52·5 c/s. If necessary, deviations of ± 5 c/s, can be accommodated with a maximum non-linearity of 10 per cent.



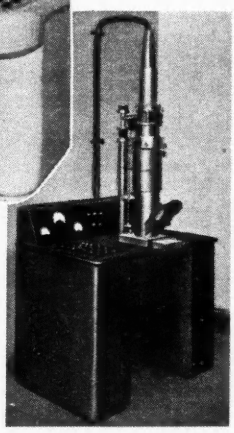
Circuit diagram of the B.P.L. frequency monitor

Electron Microscopes

Magnification up to 150,000 Times

SOME three years' experience of the second type of electron microscope to be made by the Metropolitan-Vickers Electrical Co., Ltd,. Trafford Park, Manchester, 17, has enabled the third type to be greatly improved. The electron " gun " at the top of the vertical tube has been completely redesigned to furnish a beam of much higher intensity, currents up to fifteen times those previously available being obtainable. Consequently direct electronic magnification up to 100,000 times can be employed, provided the specimen under observation can withstand such intense bombardment, while the specimen stage is mechanically stable enough for micrographs to be taken at that magnification.

Above : Desk - type Philips instrument with separate generator alongside



Right: Prototype of " Metrovick " 100-kV electron microscope

The tube itself has been made smaller by the use of an extra intermediate projector lens, which additionally allows the magnification to be varied from 1,000 to 100,000 without altering the focal length of the objective lens, or changing the specimen holder; the double projector lens system minimizes distortion at the lesser magnifications. There is provision for obtaining pairs of micrographs without removing the specimen from the microscope.

The magnetic lenses have not been greatly changed, but the windings are now placed outside the vacuum chamber, improving the cooling and thus enabling more ampere-turns to be provided in a given space.

The smaller tube can be made more rigid and its smaller volume reduces the evacuation time to 2·5 minutes, thereby obviating the need for air locks and simplifying the design of specimen chamber and camera mechanism. It also permits both rotary and oil-diffusion pumps to be switched on together. A pilot lamp indicates correct diffusion temperature, at the same time releasing interlocks to permit the high and filament voltages to be switched on.

The latter are derived through a screened cable from a separate cubicle, so minimizing stray magnetic fields near the microscope. Both sources are immersed in the same oil tank, only 1 cu ft in size. The high voltage is furnished by a rectifier fed by a h.f. oscillator, the amplitude of which is controlled by a feed-back amplifier for stabilization. A lower voltage stabilized h.f. source serves the filament. It is hoped to raise the voltage of the h.f. generator so as to furnish 100 kV in the near future.

In contrast to the more usual vertical models there is the Philips desk type, developed in co-operation with the Institute for Electronmicroscopy at Delft (Holland) which makes it possible to have continuously variable magnification from 1,000 to 150,000 times.

Focusing has been simplified and, furthermore, few manipulations are needed to effect the change which will produce on the viewing screen (instead of an enlarged image of the object) an electron - deflection diagram of the part previously pictured.

Details of the image can be further examined through a magnifying glass(shown turned aside in the photograph) attached to the screen casing. A built-in camera enables the image to be photographed on a scale reduced to one-fourth, while the 35 mm film can be enlarged again several times; more than twenty photographs can be taken without interruption.

The high voltage required to accelerate the electron beam is produced by a generator in a separate case (on the left of the photograph) the output of which is stable to 10 V in 100,000 V and capable of regulation from 40 to 100 kV.

Flameproof Equipment Code

AUTHORITATIVE guidance on the installation and maintenance of flameproof electrical equipment for industrial use (not in coal mining) is contained in CP. 1003 (British Standards Institution, 24, Victoria Street, S.W.1, 2s. post free). The recommendations of this Code of Practice include a section on intrinsically safe circuits and apparatus, mentioning precautions which are necessary.

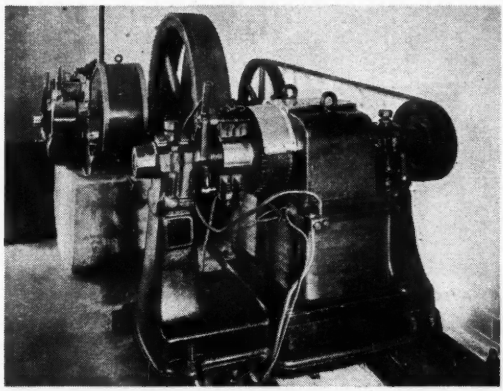
COMMERCE and INDUSTRY

Wage Claim Rejected. Ships' Installations.

LAST week the Engineering and Allied Employers' National Federation announced its rejection of the claim for consolidation and increase of wage rates made by the Confederation of Shipbuilding and Engineering Unions on 14th April. The claim was for a national minimum consolidated rate for skilled men of £5 15s. a week and for unskilled men £5 a week, an increase of about 13s. in each case. It was also asked that piecework arrangements should allow a workman of average ability to earn not less than 20 per cent more than the new rates. The decision was reviewed by the group council of the Confederation on 10th June, when it was agreed to call an extraordinary general meeting of the affiliated unions' executive council at York on 14th July.

A Long-Life Dynamo

Over fifty years ago, when the General Electric Co., Ltd., had a small engineering works in Manchester, the company supplied one of its "Byng-Hawkins" dynamos for service at a private house in Wimbledon Park. This machine had an output of 50 A at 140 V when running at 1,140 r.p.m., and was used for house lighting and to supply power to the motors of an electric organ. Twenty-seven years later it was bought by James Webb & Sons, and installed in their works at Bloxwich. After running in these works continuously for several years, it then served as a standby plant and was eventually put into store. There it remained until the fuel crisis, when the machine was brought into service once more to supplement the power produced by a modern G.E.C. generator, which forms part of the works' 110-kW d.c. and a.c. generating plant. Throughout its long life, the only maintenance to be carried out on this machine consisted of reinsulating the end of the commutator, which was skimmed, and replacing the original copper brushes with carbon brushes. The original bearings are still sound and show no signs of wear.



A "Byng-Hawkins" dynamo still in use after fifty years' service

Society of Inventors' Exhibition

The second annual exhibition organized by the Birmingham Branch of the Society of Inventors will be held in the Chamber of Commerce Building, Birmingham, from 25th to 30th October next. The object of the exhibition is to show to manufacturers and members of the public the new devices that have been produced during the year. Entries for the exhibition are accepted both from members of the Society and from non-members. Anyone wishing to enter an exhibit, which must be either patented, protected or of registered design, should write to the secretary, Mr. B. Thornton Clark, 244, Stoney Lane, Yardley, Birmingham, 25.

Low Temperature Heating

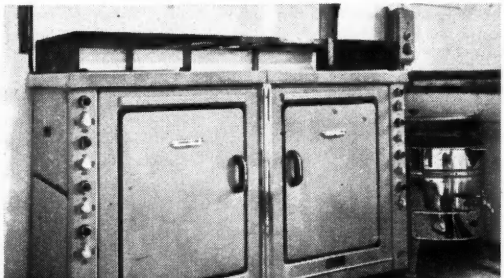
A coffee and conference room panelled in Nigerian Walnut, has just been opened at the Engineering Centre, Glasgow. This lounge has been provided by Wylie & Lochhead, Ltd., ships' furnishers of Glasgow. An important feature of the room is the system of heating. This installation, radiates an even glow of heat through the wood panelling on the walls. This low temperature electrical panel heating has been evolved by Mr. A. Mennie of Wylie & Lochhead, Ltd., using a timber frontage in conjunction with "Dulrae" heating elements manufactured by Richard Crittall & Co., Ltd.

Between the low temperature heating unit and the plaster wall, suitable insulation prevents heat being lost "backwards" through the walls. A special type of wall board, more durable than normal and highly polished, is then prepared and secured to the outer veneer in such a way as to prevent any risk of bulging, peeling or cracking of the wood or spoiling the highly polished surface in any way. The system installed at the Centre operates in three circuits, each thermostatically controlled to ensure a balanced temperature of any desired degree.

A three-day test held the room temperature at 110 deg for 72 hours continuously without any deleterious effect on either the wood veneer or surface polish.

Scientific Co-operation

The British Commonwealth of Nations Scientific Liaison Offices (London) have been opened on the third floor of Africa House, Kingsway, W.C.2. This is one of the measures to facilitate co-operation in the civil aspects of science within the Commonwealth, decided on by the British Commonwealth Scientific Official Conference held in London in 1946. For a number of years several of the Commonwealth countries have maintained scientific liaison offices in London and these together with the ones about to be established will now have their headquarters in Africa House. Each of these offices will continue to operate as in the past, retaining complete independence of action, but the convenience of occupying adjacent premises will facilitate co-operation between them on matters of common interest. The offices taking part in the scheme are the scientific liaison offices of Australia, Canada, Central African Council, India, New Zealand, South Africa and the United Kingdom. Pakistan and the Commonwealth Agricultural Bureaux will be represented and the Overseas Liaison Division of the U.K. Department of Scientific and Industrial Research will work in Africa House.



A " Creda " double-oven range installed on the " N.V. Norge "

Brush Foremen's Conference

The sixth annual conference of the Brush Foremen's Association was held last week-end at the Falcon Works, Loughborough, of the Brush Electrical Engineering Co., Ltd. To mark the opening, a dinner was held on Friday at which Mr. A. P. Good, managing director, presided, and Sir George Schuster spoke. Delegates from over forty electrical and engineering firms were present. On Saturday matters discussed included the viewpoints of a manager, a psychologist and a trade unionist, while on Sunday, the subject was the shop floor viewpoint.

Building Regulations

The Minister of Labour and National Service has made new regulations under the Factories Act, 1937, for the safety, health and welfare of workers employed in building operations. The Regulations, which are entitled the Building (Safety, Health and Welfare) Regulations, 1948 (S.I. 1948 No. 1145, H.M. Stationery Office, price 10d., post free 11d.), will come into force on 1st October next, and will supersede the existing Building Regulations under the Acts made in 1926 and 1931.

Equipment on the " N.V. Norge "

The King of Norway's yacht *N.V. Norge* was originally built in 1936-7 for Mr. T. O. M. Sopwith, as the *M.V. Philante* and from 1939 to 1945 she served as a Naval Auxiliary on convoy duties in the North Atlantic and North African Landings. In 1947 she was purchased by the Norwegian nation as a gift for King Haakon. This ship has now been reconditioned and altered after her war work. The galley equipment is " Creda," manufactured by Simplex Electric Co., Ltd., the accompanying picture showing a double oven range fitted with storm rails and finished in vitreous enamel, with splash-plate and pot rack. A similar double oven range is installed in the crew's galley, while a " Creda " hot-cupboard fitted with top and bottom heat is in the pantry next to the dining room. In addition to the heavy-duty cooking equipment the Royal yacht is fitted with Simplex switchgear and installation materials.

Dental Treatment for Workers

Throughout industry in general increasing interest has been shown recently in the physical well-being of employees, and many concerns have recently tried the experiment of providing dental treatment. An interesting forerunner of these schemes is that of British Insulated Callender's Cables, Ltd., whose dental scheme was inaugurated in 1925 at the Prescot factory and now embraces also the Leigh, Helsby and Melling factories. The whole cost of staffing, equipment, etc., of the dental surgeries and laboratories has been borne by the company and treatment is carried out during working hours, all time spent by employees in utilizing the facilities being paid for at normal rates.

The scheme has operated both as a supplement to and independently of the National Health Insurance Scheme; in those cases where N.H.I. benefits have not been available for dental treatment, the company has borne 50 per cent of the fees for fillings and conservative treatment and 25 per cent of the fees for artificial dentures, there being arrangements for weekly deductions from wages. For juvenile employees, the fee for conservative treatment is limited to 2s. 6d. for each filling or scaling. During the past twelve months there have been 15,300 attendances.

Post Office Workers' Conference

In the course of his address at the opening of the Annual Conference of the Post Office Engineering Union at Weston-super-Mare on Tuesday last, the chairman (Mr. Ernest Power, Leeds) called for a committee of inquiry to investigate the Post Office organization, including the status and conditions of the staff. Joint production committees had been set up and in the main they were doing well, but they would not be doing well much longer unless there was a favourable response to the claims made by the Union.

Shropshire Agricultural Show

A feature of the annual Shropshire and West Midland Great Agricultural Show held at Dewsbury on 19th and 20th May, was the display of John Bromley & Co. (Wellington), Ltd. The main entrance to the stand was surmounted by a 3-ft electric clock above which was an illuminated electric sign "Electricity on the Farm." The exhibits included a wide range of domestic electrical appliances and equipment for the farm house and workshop. There was also an electric dairy section, an electrically operated hoist, an "Essex" grinding mill, and electric lighting plants. In addition to providing an electricity supply for its own exhibits, the company also supplied a number of other stands for the demonstration of equipment.

Low-Voltage Soldering Irons

"Solon" soldering irons, made by W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, London, E.C.1, are now available in voltages from 100 to 130 as well as 200 to 230.

Ships' Auxiliaries

Associated British Oil Engines, Ltd., has received from R. & W. Hawthorn, Leslie & Co., Ltd., Newcastle-on-Tyne, orders for twelve marine auxiliaries driven by Mirrlees diesel engines. Six of these are 150-kW, 220-V sets driven by Mirrlees "TLB5" five-cylinder engines rated at 262 b.h.p. at 600 r.p.m. and will be installed in two single-screw cargo vessels being built by Sir James Laing & Sons, Ltd., for Sir R. Ropner & Co., Ltd. The remaining six are 170-kW, 230-V sets driven by Mirrlees "TLB6" six-cylinder engines rated at 315 b.h.p. at 600 r.p.m. and are for two single-screw bauxite ore carriers being built by R. & W. Hawthorn, Leslie & Co., Ltd., for the Alcoa Steamship Co., New York. The main propelling machinery in each vessel will be of the Hawthorn-Doxford type.

Conditions in Colombia

A report received by the Export Department of the Board of Trade indicates that although the Colombian scene is still confused, it has now been possible to form some impression of recent events and their likely reaction on British export trade. No reason appears at present why Colombia should not be as good, if not a better, customer for British goods than hitherto, though prompt deliveries will be more than ever vital and some further discrimination against less essential and luxury goods is possible.

Market Research

In October last the Manchester Joint Research Council staged a one-day conference in Manchester on the subject of "Market Research." On that occasion three papers dealing with the technique of market research and the investigation of consumer tastes, with emphasis on the importance of research and the seller, were presented. These have now been published in book form, copies of which (2s. 6d. each, plus postage) can be obtained from the Council, c/o Manchester Chamber of Commerce, Ship Canal House, King Street, Manchester, 2.

Coil Spring Federation

At the recent annual meeting of the Coil Spring Federation held in Birmingham, the activities of the Technical Committees and of the Research Organization were dealt with respectively by Mr. H. Singleton and Dr. R. Genders. A combined meeting of the Coil Spring Federation and the Coil Spring Federation Research Organization followed, when a lecture was presented by Dr. J. A. Pope on the results of some recent research dealing with the "Prestressing of springs with special reference to the internal stresses induced." Mr. R. Bache, the president, in opening the meeting, referred to the policy of the Research Organization towards direct contact between research and industry so that the results could be discussed and find early practical application. Mr. Singleton on behalf of the Research Committee outlined the objects of the work.

Lighting a Sugar Beet Factory

An exterior lighting installation which enables sugar beet to be received by road and rail throughout the night has just been completed by the General Electric Co., Ltd., for the British Sugar Corporation's Poppleton Factory, York. The area, which embraces rail sidings, roadways and silos, is lighted by twenty-

three " Duoflux " floodlights, equipped with 400-W " Osram " high-pressure mercury-vapour clear lamps, and five " Difractor " street-lighting lanterns.

World Power Conference

The Annual Report (1947) of the World Power Conference has just been issued from its Central Office at 201-2, Grand Buildings, Trafalgar Square, London, W.C 2. Reference is made to a decision to hold the next plenary meeting in London in 1950 and to the consultative status accorded to the organization by the Economic and Social Council of the United Nations. A list of publications issued under the auspices of the International Executive Council includes the series of National Reports on Fuel Economy since 1939 and the Statistical Year Book (of resources), a further edition which is to be issued shortly.

Arc Welding Electrodes

At the recent annual general meeting of the Arc Welding Electrode Section of B.E.A.M.A. Mr. W. A. Watt (British Oxygen Co. and Quasi-Arc Co.) was re-elected chairman of the Section and Mr. R. E. Clipsham (Lincoln Electric Co.) was elected vice-chairman. Dr. J. H. Paterson (Arc Manufacturing Co.) was elected chairman of the Technical and Production Committee and Mr. E. S. Waddington (Philips Electrical), chairman of the Committee. It was stated at the meeting that manufacturers were able to meet only about half the home demand for electrodes because of the shortage of core wire. The situation was such that imports of electrodes, at prices higher than those ruling in Great Britain were being permitted from European countries and dollars were being expended on importing electrodes from the United States, although ample electrode manufacturing capacity was available in this country.

Change of Address

The Tees Sub-Area office of the **North Eastern Electricity Board** is now at Central Buildings, Church Street, West Hartlepool.

Trade Announcements

The Hoffmann Manufacturing Co., Ltd. has opened a new branch at 18, Tempest Hey, Liverpool, which will carry an emergency stock of ball and roller bearings. (Telephone: Central 3595 ; telegraphic address " Mannhoff, Liverpool."

Barlow-Whitney, Ltd., have established a subsidiary company in South Africa with the title Barlow-Whitney South Africa (Pty.), Ltd. The address is P.O. Box 313, Johannesburg, and the local directors are Messrs. F. G. Gibbs, L. A. S. Robbins and F. G. Bowling.

Change of Name

Power-Utility Supply Co., Ltd., has changed its name to Power Utilities, Ltd.

Trade Publications

Rediffusion, Ltd., Broomhill Road, Wandsworth, S.W.18.—Technical leaflet on the R.H. 24 350-W dielectric heating unit.

Watson & Sons (Electro-Medical), Ltd., Sunic House, 43, Parker Street, London, W.C.2.—Illustrated catalogue of X-ray equipment for medical purposes.

George Cohen, Sons & Co., Ltd., Wood Lane, London, W.12.—List of diesel, petrol and steam driven generating equipment from 1 kW to 3,000 kW.

Trade Marks

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from 9th June:—

ERRES. No. 655,887, Class 7. Electric floor-polishing machines (other than domestic electric floor-polishing machines), electric washing machines, and electric motors (other than electric motors for land vehicles), and parts included in Class 7 of all such goods.—Naamlooze Vennootschap Handelmaatschappij R. S. Stokvis & Zonen, 507, Westzeedijk, Rotterdam. Address for service: c/o Stanley, Popplewell & Francis, 88-90, Chancery Lane, London, W.C.2.

DURAWIRE THE WORLD (Design). No. 657,530, Class 9.—Insulated electrical wire. Duratube & Wire, Ltd., 16, Hanworth Road, Feltham, Middlesex.

MEMACE. No. 658,767, Class 9. Electrical apparatus and instruments included in Class 9. —Midland Electric Mfg. Co., Ltd., M.E.M. Works, Reddings Lane, Tyseley, Birmingham,11.

DRAKA. No. 659,331, Class 9. Insulated electric wires and cables.—Naamlooze Vennootschap Hollandsche Draad-en-Kabelfabriek, Hamerstraat 10, Amsterdam. Address for service: c/o J. E. Evans-Jackson & Co., Ltd., 49, Albert Hall Mansions, Kensington Gore, London, S.W.7.

TIVI. No. 651,220, Class 10. Electrical fires for domestic use.—J. Pargeter and F. E. Pearcey, trading as Tivi Mfg. & Tradg. Co., 352, Dudley Road, Tividale, Tipton, Staffs.

PETCO. No. 656,070, Class 11. Installations for lighting, heating, cooking, refrigerating, drying and ventilating.—Petrinovic & Co., Ltd., 25-31, Moorgate, London, E.C.2.

ROCHELE. No. B658,886, Class 11. Lamps and lampshades and fittings for lamps and shades.—H.N. Electrical Supplies, Ltd., 46, Golden House, Great Pulteney Street, London, W.1.

RENAT. No. 659,454, Class 11. Lighting fittings and parts thereof included in Class 11. —New Endeavour Engg., Ltd., 4a, Avenue Road, Harlesden, London, N.W.10.

ROTOCLONE. No. 660,235, Class 11. Installations for heating, drying and ventilating.—Air Treatment Engg. Co., Ltd., 100, Gelderd Road, Leeds, 12.

Inventions Agreements

Effect after Termination of Employment

By F. E. Sugden,
A.C.I.S., Barrister-at-Law

WHERE a person invents new apparatus to meet special requirements in the course of his employment, what is the position after he leaves his employer's service?

This point arose in a recent case in which a research chemist employed by a company undertook that, so long as he was bound by the agreement, any improvements or inventions made or discovered by him should without payment become the sole exclusive property of the company, which would give him such remuneration as it thought reasonable. It was further provided that he would, if required by the company, but at its cost, apply for letters patent or other equivalent protection in all countries as the company might require, and would do all he could to help the company to obtain and maintain them. In 1943 he made certain inventions for which he applied for letters patent in Great Britain at the cost of the company, to which he assigned all his interest. His employment by the company came to an end in 1945 and in 1947 the company asked him to assist it to obtain patent protection for the inventions in foreign countries, but he refused to do so.

The only person who can apply for letters patent is the person who actually brings into existence something original. Where an employee leaves the company, can he still be compelled to assist his former employer to take out letters patent in his own name and then subsequently sign them over to the company? The answer is "Yes," and therefore an employee must be careful what arrangements he makes with his employer. Conversely, the company must take care to protect any inventions which originate in its laboratories and for which it has provided labour and material.

There is a more important case in this connection which again emphasizes the law and on which the case I have quoted was based. The plaintiff company employed chemists for research work, and suitable processes thus discovered were patented by the company. The person who defended the action was an assistant chemist, who, by his contract with the company, undertook to communicate to the company any process discovered by him, and to assign to the company any patents granted to him. The contract further provided, in general terms, that all available information gained by the defendant should be communicated to the company and that such information should be the exclusive property of the company. Subsequently he discovered a method of producing a special kind of acid, and this discovery was the subject of a patent application. The plaintiff company, however did not proceed with the patent. Certain further discoveries were communicated to the company two years later before the employee left the service of the company. A few months later, after he had left, he discovered the properties of an acid as an adhesive, not for the purposes of safety glass, but for laboratory glass, and twelve months later he was granted a patent to protect that discovery. This particular discovery would prevent the company from using acid as an adhesive in the manufacture of safety glass, as it later wanted to do. As a consequence the company negotiated for the purchase of the patent, but without success, and therefore brought an action for a declaration that it was entitled to have the patent assigned to it.

The Court held that the company was not so entitled under the express terms of the contract, because a provision for the communication to the company of general knowledge, as distinct from secret processes, acquired in the course of the employment and the preventing of the use of such information after the employment had ceased was too wide in its effect, and, therefore, unenforceable as contrary to public policy. That means to say, that if an employee discovers a certain new process because of his long study of other matters in the research laboratories, the company could not compel the employee to transfer that new patent to them.

The Court further held that the first invention, that is, a special kind of acid, should be assigned to the company because the former employee was a trustee of the invention for the plaintiff company, and therefore was bound to assign the rights therein when requested to do so by the company, subject to his being indemnified against any costs to which he might be put. The mere facts that the company refused to

use the invention at a specific date and that there was a considerable delay in applying for a patent, in itself did not amount to a release by the company or a waiver of its rights.

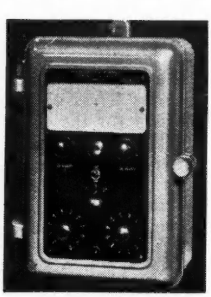
The effect of this judgment is that a secret process must not be disclosed by an employee either during his employment or afterwards, but the law does not extend this protection further than is necessary to protect the actual processes of the manufacturer. An employee cannot, after the employment has ceased, be restrained from using the general knowledge which he acquired during his employment. An invention, however, made during his employment, which he is under a duty to impart to his employers, and the patent rights in which he is bound by contract to assign to them, is held by him in trust for his employers. There may be circumstances which amount to a release of the employers' rights, but the mere fact that they do not think it necessary or desirable to use such a process until three or four years after the termination of the employment is not in itself evidence of such a release.

Electrical Hygrometer

Apparatus for Textile Processing

CORRECT determination of the moisture content of fabrics is important in the processing of textiles. Over-drying reduces the output of the drying machine and results in a poorer quality of warp, while underdrying the latter may cause trouble subsequently in weaving and increases the risk of mildew attack.

Continuous visual indication of the moisture content is made possible by the employment of Shirley hygrometers which were designed at the Shirley Institute of the British Cotton Industry Research Association and are made by John Dalglish & Sons, Ltd., Avenue Works, Pollokshaws, Glasgow, S.3.



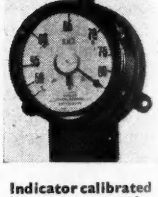
Switch panel on cast aluminium instrument case

The hygrometers are usually installed on the warp sizing machines and on the stenters for piece goods, being equally suitable for cotton and rayon, but adaptable to most fabrics. The direct reading 6 in. (15·24 cm) indicator registers 5 to 0 in A clockwise with zero at the right hand side. Its dial is usually calibrated in relative humidity, the central scale figure of 65 per cent having been chosen after investigation of the atmosphere within textile processing rooms; calibration can alternatively be in percentage of moisture content.

One or two separately mounted indicators may be connected by cable to the instrument which is, in turn, connected by cable to the measuring head. The latter detects changes of electrical resistance between two points on the cloth, or warp, according to moisture content, so varying the resistance network associated with the grid of a triode valve and thus altering the plate current, to which the indicator responds.

The grid resistance is adjusted to suit different weights of fabrics or warps, by means of a 60-point shunt-selecting switch, each of the dial studs being correlated with a particular "warp factor." For the common case of cotton warp this factor is calculated by dividing the number of "ends" (yarns) by the "count" (gauge) of the yarns. Switch settings appropriate to different warp factors are selected from a table fixed to the front panel of the instrument case.

In the case of warp sizing machines the resistance path is made by insulating a roller near the finishing end of the machine. The distance between this roller and the one preceding it and the distance from the insulated roller to the first warp splitting rod must be known. These two distances together form a total resistance track from the insulated roller to earth, from which the equivalent track length is calculated so that a table of warp factors can be made up for each individual machine. Warp factors involved in warp sizing range from 20 to about 500. If a very low factor is required, it can be obtained by reducing the track length.



Indicator calibrated in percentage relative humidity

When drying fabrics on stenters or other machines the warp factor method does not apply, as there are great variations in material and construction; so individual calibrations are obtained by experiment. Alternatively, once a suitable cloth-drying speed has been obtained by hand feeling, the indicator will enable the relevant moisture content to be maintained and repeated.

The instruments are very sensitive and reliable.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

British Insulated Callender's Cables, Ltd., reports a total profit for 1947 of £3,024,629, as compared with £2,354,379 for the preceding eighteen months, to which is added receipts applicable to earlier periods of £150,855. Depreciation receives £381,702, profits tax and overseas taxation £381,105, and United Kingdom income tax £1,383,522. The final ordinary dividend is 4¾ per cent, making 6¾ per cent for the year. The total dividend is at the same annual rate as that paid for the previous eighteen months. The balance carried forward is £605,112 (against £191,756 brought in).

A. C. Cossor, Ltd., report a trading loss of £22,043 for 1947-48, as compared with a net trading profit of £214,145 for the preceding year. The preference dividend is paid, but no distribution is made on the ordinary (against 25 per cent, less tax, plus a cash distribution of 7 per cent from capital profits). The consolidated net trading profits were £70,763 (against £320,921), and with interest and net recoverable taxation, there is a balance of £119,642. After making various provisions, there is a deficit of £121,604. In a statement issued with the report and accounts, Lord Burghley (chairman) says that the successive increases in purchase tax to 66⅔ per cent has had the effect of bringing home sales almost to a standstill, and has left the distributing and producing sections of the industry loaded with stocks which the public cannot afford to buy.

The **London Electric Wire Co. & Smiths, Ltd.,** in its report for 1947 states that the accounts have been rearranged and group accounts have been included for the first time. The previous year's figures have therefore been omitted as they would not be comparable. The trading profit, including profits of subsidiaries to the extent of dividends declared, is £529,868, plus investment income and fees £40,648, making £570,516. Depreciation requires £67,691, directors' fees £1,050, taxation £344,017, and provisions £39,990, leaving a balance of £117,768. Revenue reserves receive £60,000 and it is proposed to pay a final ordinary dividend of 7½ per cent, making 10 per cent for the year (same). The balance carried forward is £150,898 (against £147,254 brought in).

Ruston & Hornsby, Ltd., report a trading profit, together with dividends from subsidiary, associated and other companies, for the year to 31st March last of £1,118,977, as compared with £627,973 last year. After deducting depreciation (£133,874), debenture interest (£15,750), profits tax (£119,558) and income tax (£369,141) there is a net profit of £480,654 (£284,649 last year). It is proposed to appropriate £150,000 to plant replacement reserve, £25,000 to pension provision, £140,000 to general reserve, and to pay 12½ per cent, less tax, on the ordinary stock. A balance of £140,304 (£100,324 last year) is carried forward. The combined trading profit of the company and the subsidiary companies, together with dividends from associated and other companies, amount to £1,343,000 as compared with £850,309 last year. After deducting depreciation (£179,295), debenture and other interest (£17,687), profits tax (£157,558) and income tax (£445,391) there is a combined net profit of £543,069 (£316,152 last year). Subject to Treasury consent being obtained, the directors propose to make a further issue of shares.

The Dubilier Condenser Co. (1925), Ltd., reports a net profit for the year ended 31st March last of £74,951, as compared with £22,578 for the preceding year. The ordinary dividend for the year is maintained at 20 per cent, general reserve receives £20,000, and dividend reserve £20,000. The balance carried forward is £53,672 (against £32,687 brought in).

Aron Electricity Meter, Ltd., reports a profit for the year ended 31st March last of £75,624, and after allowing for income tax, there is a balance available of £27,289, as compared with £18,822 for the previous year. General reserve receives £12,500 and the dividend for the year is maintained at 15 per cent. The balance carried forward is £25,498 (against £23,244 brought in).

Newman Industries, Ltd., reports a net balance for the year to 3rd January last of £56,510, as compared with £48,830 for the previous year. The ordinary dividend for the year is maintained at 20 per cent, and the bonus of 2½ per cent is repeated. The balance carried forward is £42,354 (against £36,101 brought in).

The Revo Electric Co., Ltd., reports a net profit for the year ended 31st March last of £230,714, as compared with £131,451 for 1946-47. The final ordinary dividend is 12½ per cent, making 17½ per cent for the year, plus a bonus of 10 per cent. The distribution is the same as for the previous year.

South African Electricity Supply Commission.—The issue of a £15 million loan was oversubscribed when the lists closed at noon on 10th June. The loan, bearing interest at 3½ per cent, covers the purchase of the £14,500,000 Victoria Falls and Transvaal Power undertaking, negotiations for which were completed recently.

Atlas Electric & General Trust, Ltd., reports a net profit of £173,687 for the year ended 31st March last, as compared with £171,297 for 1946-47. The ordinary dividend for the year is 2 per cent (against nil) and £252,640 is carried forward (against £232,453 brought in).

R. A. Lister & Co., Ltd., propose to offer to ordinary stockholders 200,000 new £1 ordinary shares at 75s. each in the proportion of one share for every £5 of stock held. The proceeds will be used for the further development of the company's export trade and to finance the cost of additional machinery. An extraordinary meeting will be held on 21st June to create an additional 300,000 shares.

G. N. Haden & Sons, Ltd., report a trading profit of £32,756 for 1947, as compared with £13,815 for 1946. Taxation requires £24,000, and the ordinary distribution for the year is unchanged at 25 per cent. The balance carried forward is £130,578 (against £140,277 brought in).

The Lisbon Electric Tramways, Ltd., reports a net profit for 1947 of £66,056, as compared with £59,790 for the previous year. The ordinary dividend for the year is maintained at 5 per cent, tax free, and £38,026 is carried forward (against £33,565 brought in).

Vent-Axia, Ltd., has announced a final dividend at the rate of 150 per cent, less tax, making a total of 250 per cent for the year ended 31st March last.

Walsall Conduits, Ltd., has announced a final distribution of 50 per cent (including 15 per cent bonus), again making 70 per cent for the year.

New Companies

Shelman Electric Co., Ltd.—Registered 1st June. Capital, £3,000. To acquire the business of an electrical engineer carried on at Limes Road Works, Oakengates, Salop, as Shelman Electric Co. Directors: Mrs. Eva Williamson and R. F. Clemson. Regd. office: Lines Road Works, Oakengates, Salop.

G. R. Ayres, Ltd.—Registered 15th April. Capital, £1,000. Wholesale and retail merchants and manufacturers of refrigerating plant, electrical and radio equipment, etc. Directors: W. H. Ayres (director of Refrigeration Service, Ltd.) and S. A. Foster. Regd. office: 257, Stockport Road, Ashton-under-Lyne.

Elite Electrical Distributors (Leicester), Ltd.—Registered 10th May. Capital, £6,000. To acquire the business of electrical wholesalers now carried on by A. A. Lee and J. C. Fisher at 28-32, Colton Street, Leicester, as Electrical Accessories Co. Directors: A. A. Lee and J. C. Fisher. Regd. office: 1b, Halford Street, Leicester.

Wayne Kerr Engineering Co., Ltd.—Registered 4th May. Capital, £10,200. Manufacturers of, and dealers in, equipment and appliances used in radio, electrical and electronic trades, etc. Directors: R. H. Cottam Foxwell, I. Cottam Foxwell, D. L. Breeden, E. H. Whatley, R. Calvert and N. S. Hunt. Regd. office: 15, Cromwell Road, S.W.7.

A. & B. Installations (Staines), Ltd.—Registered 8th May. Capital, £400. To acquire the business of electrical and radio engineers carried on by H. F. Ambrose as A and B Installations at 62a, High Street, Staines, Middlesex. Directors: H. F. S. Ambrose and K. G. Ambrose. Regd. office: 62a, High Street, Staines.

Deeside Electric, Ltd.—Registered 14th May. Capital, £5,000. Electrical, electronic, radar, radio and general engineers, etc. Subscribers: W. M. Good, T. P. Hogan and C. E. Drever. Solicitors: Frere, Cholmeley & Nicholsons, 28, Lincoln's Inn Fields, W.C.2.

Welwynd Co., Ltd.—Registered 11th May. Capital, £1,000. Manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, etc. Directors: W. S. R. Cavan, V. J. Wells, Mrs. S. Cavan, J. T. Whistondale and F. H. C. Betts. Secretary: F. H. C. Betts. Regd. office: 41, Lower Road, Sutton, Surrey.

Elnaugh & Son, Ltd.—Registered 11th May. Capital, £2,000. Electrical engineers and contractors, etc. Directors: A. S. C. Elnaugh and N. A. Elnaugh. Solicitors: W. Hilliard & Ward, Chelmsford.

H. C. Pretty & Son (Wholesalers), Ltd.—Registered 12th May. Capital, £10,000. Wholesalers of electrical equipment, electrical and radio engineers, etc. Subscribers: Sarah A. Pretty and I. C. Pretty. Regd. office: Victoria Works, Church Gate, Leicester.

Oldham Boilers (Preston), Ltd.—Registered 13th May. Capital, £500. To acquire patent rights granted to F. E. Oldham, Churchtown, Southport, in respect of the manufacture of Oldham electric boilers, etc., and to carry on the business of ironfounders, mechanical and electrical engineers, etc. Directors: W. H. Bowker, A. Dodgson, T. L. Eaves and F. E. Oldham. Regd. office: 41, Fishergate, Preston, Lancs.

A. W. Saxton (Electrical), Ltd.—Registered 28th April. Capital, £2,000. Manufacturers of, and dealers in, lighting apparatus, electrical plant and accessories, signs, wireless goods, etc. Directors: A. W. Saxton and Mrs. E. Saxton. Regd. office: 49, High Street, Hucknall, Notts.

Harris & Stacey, Ltd.—Registered 27th April. Capital, £3,000. Electricians, wiring contractors, electrical, radio and general engineers, etc. Directors: E. J. Harris and G. H. Stacey. Regd. office: 40, Belvoir Road, Coalville, Leics.

General Electrical Installations (Wilts), Ltd.—Registered 1st June. Capital, £2,000. Directors: D. F. Cockerill, R. O'Brien and C. H. Cockerill. Regd. office: 4, Station Road, Warminster, Wilts.

Palfreman & Ross, Ltd.—Registered in Edinburgh 20th May. Capital, £1,000. Consultant engineers and specialists, electricians, electrical, wireless and television engineers, etc. Directors: G. Palfreman and A. Ross. Regd. office: 629, Argyle Street, Glasgow, C.3.

Electrical Industries (Abingdon), Ltd.—Registered 20th May. Capital, £6,000. To acquire the business of electrical contractors carried on by H. J. Peckham and H. Hall, as the Abingdon Electrical Industries, at 5, Ock Street, Abingdon. Directors: H. J. Peckham and S. Lynes. Regd. office: 5, Ock Street, Abingdon, Berks.

Electal, Ltd.—Registered in Dublin 21st May. Capital, £10,000. Wholesale and manufacturers' agents, importers, exporters and dealers in domestic appliances, refrigerators, washing machines, vacuum cleaners, floor polishers, pressure cookers, lighting and heating equipment, wireless and television transmitters, etc. Subscribers: S. Matthews and M. B. Kelly, both of 1-2, College Street, Dublin.

H. C. Beck, Ltd.—Registered 26th May. Capital, £2,000. To acquire the business of a wireless dealer and electrical contractor carried on by Harry C. Beck at 751, Aylestone Road, Leicester, as "H. C. Beck." Permanent directors: Mrs. E. Beck and H. C. Beck (chairman). Solicitors: Crane & Walton, Leicester.

Maxim Electrical Co., Ltd.—Registered 26th May. Capital, £2,500. To acquire the business of a dealer in electrical goods carried on as Maxim Electrical Co., by G. R. W. Feek at 463, Norwood Road, S.E. Directors: G. R. W. Feek (permanent governing director and chairman), Mrs. M. Feek and R. G. Booker. Secretary: W. P. Feek. Regd. office: 463, Norwood Road, S.E.27.

Shaw & Linford (Electrical Engineers), Ltd.—Registered 27th May. Capital, £5,000. Electrical and general engineers, etc. Directors: H. Shaw and F. Linford (secretary). Regd. office: 22, The Elms, Liverpool, 8.

T. D. & J. Hunter, Ltd.—Registered in Edinburgh 1st June. Capital, £25,000. To acquire the business of the Eastern Electric Service, Waverley Engineering Works, Norton Park, Edinburgh, and to carry on the business of electrical engineers, contractors, etc. Directors: T. D. Hunter and J. Hunter. Regd. office: Waverley Engineering Works, Norton Park, Edinburgh, 7.

Bottomley, Denne & Kershaw, Ltd.—Registered 27th May. Capital, £3,000. Electrical engineers and general electrical installation contractors, etc. Directors: E. Bottomley, R. Denne, F. Kershaw, M. Bottomley, D. A. Denne and Esthar Kershaw. Regd. office: 36, Cheatham Street, Rochdale.

Increases of Capital

Electrical Equipments (Cardiff), Ltd.—Capital increased by £1,000, in £1 redeemable cumulative preference shares, beyond the registered capital of £3,000.

F. D. Sims, Ltd.—Capital increased by £44,000, in 30,000 10 per cent cumulative redeemable preference and 14,000 ordinary shares of £1, beyond the registered capital of £14,000.

Companies Struck Off the Register

The following companies were struck off the Register on 28th May:—A.E.D. (Electric), Ltd.; Bray (Acoustic) Manufacturing Corporation, Ltd.; and Radio Services (Bayswater), Ltd.

Winding-up Petition

Trustful Products, Ltd.—A petition for the winding-up of this company has been presented to the High Court by the Commissioners of Customs and Excise, City Gate House, Finsbury Square, London, and will be heard in London on 28th June, 1948.

Receiver Appointed

Wells Pridgeon Electrics, Ltd.—A. M. Nisbet, 12/13, Grafton Street, W.1, was appointed receiver and manager by Order of Court dated 14th May.

Liquidations

Etchells, Congdon & Muir (Holdings), Ltd.—Particulars of claims by 31st July to the liquidator, Mr. J. A. Hulme, 18, Lloyd Street, Manchester, 2. This liquidation is for the purpose of reconstruction only and this notice is purely formal. All creditors have been or will be paid in full.

The Kalgoorlie Electric Tramways, Ltd.—Winding up voluntarily. Joint liquidators, Mr. S. J. S. Eley, 1, Broad Street Place, London, E.C.2 and Mr. A. E. Read, 117, Old Broad Street, E.C.2.

The Braddon Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. H. Nailer, Bridge House, Rode, near Bath.

International Radio & Electrical Holdings, Ltd.—Winding up voluntarily. Liquidator, Mr. G. R. Mackay, 35, Clarges Street, Piccadilly, London, W.1.

Murphy Radio, Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. R. J. Butterworth, 62, Brook Street, London, W.1. This liquidation is solely for the purposes of reconstruction and all creditors have been or will be paid in full.

Cosmo Electrical Trading Co., Ltd.—Winding up voluntarily. Liquidator, Mr. C. N. Baker, Standbrook House, 2-5, Old Bond Street, London, W.1.

Bankruptcies

E. Ball, electrical contractor, Old Hall Street, Middleton.—Order made 6th May, suspending discharge for six months.

R. H. Ball, formerly 12, The Parade, Leamington Spa, electrical engineer, and carrying on business at Gordon Street, Leamington Spa, and now of 36, Whitefriars Road, Hastings.—Receiving order made 8th June, 1948, on a creditor's petition.

STOCKS AND SHARES

WITHIN the past few days British Electricity 3 per cent stock 1968-1973, issued in payment for Home Electricity stocks and shares, has changed hands up to its par price of 100, while British Transport 3 per cent stock, given in exchange for Home Railway issues, hardened to 96¾. For the improvements in these, and other gilt-edged stocks, the main reason is the increasing anxiety on the part of capital to find employment in purely safety-first stocks. Industrials, as a consequence, have lost some of their previous popularity, in spite of the excellent results that many front rank undertakings nowadays publish in their annual reports.

Dividend Limitation

In spite of the heavy hand of the tax-gatherer, profits show substantial expansion in the majority of cases. Nevertheless, the self-sacrificing principle of dividend limitation, imposed voluntarily by companies in response to the Government's wish that distributions should not be increased, serves to check investment in ordinary shares and junior classes of capital. A yield of 4 per cent from well-secured shares, preference or ordinary, is still considered a desirable object. New issues that offer anything like attractive terms find little difficulty in securing prompt subscription. Stock Exchange business, as a whole, is running on quiet lines.

British Insulated Callender's

B.I.C. had announced, in advance of the final dividend decision, that last year's rate would not be exceeded. The total of 6⅔ per cent for the year is equivalent to the 10 per cent paid for the preceding eighteen months. Expectation had been prepared, by other cable manufacturers' results, for good figures, and was not disappointed. Trading profits for the twelve months are nearly 40 per cent above those for the former eighteen. The £1 shares are a few pence easier, at 33s., at which the return is 4 per cent. In connection with other noticeably good profits statements, mention may be made of Aron Electrics at 56s. 3d., yielding £5 6s. 8d. per cent; Revo, which are 1/16 up at 62s. 6d., yielding £4 8s. per cent.; Dubilier Condensers at 3s., return 6⅔ per cent: and Walsall Conduits, 1s. 6d. down, at 59s., pay £4 16s. 6d. per cent. Dividends are in each case being restricted to last year's figure, despite the higher earnings.

Atmospherics

A.C. Cossor announced the passing of the final dividend, and a net loss of trading, within a few hours of the Chancellor's decision to reduce the purchase tax on radio and television sets. The two events roughly neutralized each other, leaving little net change in the depression of radio shares which has for some time been a feature of the industrial markets. Conditions in the trade have been receiving a good deal of publicity. The chairman of Telegraph Condenser, which remains closely concerned with radio equipment, lately described the industry as being up against immense difficulties. At about the same time, British Rola decided to apply for a receivership. Earlier than this, the Cossor company's decision to pay no interim dividend, and reports of surplus labour at E.K. Cole's factories, had been taken as evidence of unsatisfactory business conditions now prevailing.

Effect on Prices

As a result of the above considerations, many radio shares have fallen to their lowest ebb since the early part of the war, prices being in some cases half, or less, than last year's best figures. Cossor's present price of 9s. 6d. is only one-fourth of the high-point, 37s. 6d., of 1947. E.K. Cole have depreciated in the same period from 34s. 3d. to 15s. 9d., despite the raising of the dividend from 20 per cent to 22½ per cent. The shares yield 7¼ per cent on that distribution. Pye deferred, with an excellent dividend record behind them, have suffered relatively less, and at 20s. afford 6¼ per cent on the 25 per cent paid without fail for many years. "Emi" stand at about the same price as Pye deferred: American buying is said to be still at work, and to account partly for the yield of a modest 3 per cent. On Ultra Electrics at 5s., the yield is well into double figures, and shares in other radio companies are on a basis which may before long tempt the speculative investor into taking a view beyond the trade's present difficulties.

Changes on the Week

Falls outnumber rises in the list of Stock Exchange prices of shares in companies quoted in our monthly lists. The declines, of no great extent, illustrate the general trend more than indicate any particular pressure to sell. Johnson & Phillips at 70s. 6d. are a florin lower, and British Vacuum Cleaners at 13s. 6d. are 1s. 6d. down. Decca Record at 22s. 6d. are 3s. 9d. lower. Falls of 1/16 have occurred in International Combustion, 41s. 3d., Murex, 86s. 3d., Tube Investments, 6 1/16, Ward & Goldstone, 58s. 9d. and Canadian Marconi 11s. 3d. Brush have eased off to 6s. 9d.; and Burcos are lower at 25s. Ever Ready, 38s. 6d., Thorn, 18s. 9d. and Switchgear, 18s. have gone back a trifle. Electric Components weakened to 12s. 6d.

Tillings at £5

Rises include Crompton Parkinson 25s. 6d., Associated British Engineering, 42s. 6d., De La Rue, 45s., Mather & Platt 53s. 3d. The Cable group has attracted less attention than usual: the ordinary stock is a point to the good at 196½. Thomas Tilling touched £5 and at 99s. are 1s. higher on the week. British Electric Traction deferred at 1785 has shed 20 points.

ELECTRICITY SUPPLY

Halifax Emergency Scheme. Development in Canada.

Gateshead. — HOUSE INSTALLATIONS. — The Town Council has decided that in future tenders shall be obtained for the electrical installation in new houses erected by direct labour.

Halifax.—EMERGENCY POWER PLAN.—At a meeting in Halifax last week an emergency plan was decided upon, as a result of the breakdown of two turbo-alternators at Halifax power station a week earlier. Under this scheme, which has been agreed to by employers, employees and the local electricity officials, each of five areas will be asked not to take any power between 8 a.m. and noon on certain days. Firms will be warned by telephone, where possible, and domestic consumers by loud-speaker van. It is expected that the repairs being carried out on the two alternators will be finished by the end of next month.

Hamilton.—STREET LIGHTING.—The Town Council has approved a new scheme for the electric lighting of streets and future housing schemes.

Todmorden.—ELECTRICAL DRIVE AT GAS WORKS.—The Corporation is to apply for consent to borrow £1,200 for the installation of electrical drive at the Gas Works.

Overseas

Canada.—ELECTRIC POWER ON FARMS.—About 7 per cent of the farms in Canada's Prairie Provinces reported electric power at the 1946 Census—19,125 of the total of 269,601 occupied farms in the three provinces. There were 4,675 in Manitoba, 7,490 in Saskatchewan and 6,960 in Alberta. Manitoba had the largest proportion of occupied farms reporting electric power with 8·6 per cent. In Alberta the figure was 7·8 per cent and in Saskatchewan only 6 per cent. Of the total farms reporting electric power, 5,902 or 30·9 per cent were supplied from central power stations. Others had their own small plants.

CAMPBELL RIVER DEVELOPMENT. — The most important undertaking on which the British Columbia Power Commission is at present engaged is the John Hart Development on the Campbell River, Vancouver Island. To provide a large block of power for a major industry being developed at Port Alberni, and for general distribution in the Nanaimo area, the Commission investigated six potential sites but only that at Campbell River had sufficient capacity (225,000 h.p. at 50 per cent annual load factor). From Lower Campbell Lake the river falls 28 ft (8·5 m) in 4,000 ft (1,219 m) and at Ladore Falls where a vertical drop of 22 ft (6·7 m) occurs a reinforced concrete regulating dam has been constructed. At Irene Pool a further 5 miles (8 km) or so downstream is the main concrete dam 650 ft (198 m) long at the crest. The river then flows in a rocky canyon, over Bear, Moose, Deer and Elk falls, to Trout Pool, the site of the power station. The first of six 28,000-h.p., 327 r.p.m. Francis type reaction turbines was brought into operation last year and four are scheduled to be ready by the end of 1949. The generators are rated at 25,000 kVA, 13,200 V, 60 cycles, each being connected directly to a bank of three 8,333-kVA step-up transformers. A 170-mile (275-km) transmission line to Victoria is designed for operation at 138 kV. The longest span is 2,200 ft (670 m) over the Qualicum River.

North of Scotland Charges

THE North of Scotland Hydro-Electric Board has announced provisional tariff adjustments in certain parts of the North of Scotland Area. The Board's present standard charges for electricity will be extended to a number of areas of undertakings acquired on 1st April last and existing tariffs will be adjusted in other areas. To meet the losses which are being incurred in Aberdeen and Dundee areas at the rate of about £200,000 per annum, the Board has decided, after consultation with representatives of these local authorities, that electricity charges there will be increased as from 15th June. At Aberdeen the existing tariffs will be increased by 22½ per cent except in the case of consumers whose charges have been automatically increased, as and when coal prices were raised. At Dundee the present cash discount of 5 per cent is being discontinued and all existing tariffs increased by 17½ per cent, making a total increase of approximately 22½ per cent, the same as at Aberdeen.

The Board is bringing into operation in Dunoon, Kintyre, Thurso and Stornoway, areas at present supplied by Diesel plant, its standard charges presently applicable in Rothesay, Wick, Orkney, etc. This will mean a reduction to the large majority of consumers in these areas where the highest existing lighting rate varies between 1s. and 7d. per kWh.

The tariff for domestic consumers is based on rooms, with three steps—6d., 1d. and ¾d. per kWh. Lighting will cost 6d., cooking 1d., and other uses ¾d. The discount of 6d. in the £ will be discontinued in all areas in which the standard tariff is operative. The new tariffs for quarterly consumers will take effect for the first time on accounts rendered for the meter reading period ending about September. No change will be made meantime in the charges for electricity in areas supplied by water power. The Board is working also on new tariffs for application in due course throughout the North of Scotland.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

L. V. S. Blacker.—" Guns and missile-projectors." 9889. 18th June, 1943. (602304.)

British Thomson-Houston Co., Ltd.—" Electrode structure for X-ray generators." 18829. 16th November, 1942. (602305.)

British Thomson-Houston Co., Ltd.—" Electrode structure for X-ray generators." 18830. 16th November, 1942. (602,306.)

1944

P. E. F. Clay.—" Machine for forming and twisting multi-strand cable." 2503. 10th February, 1944. (602307.)

Magnavox Co.—" Electric impulse generator." 10175. 30th June, 1943. (602309.)

Marconi's Wireless Telegraph Co., Ltd.—" Thermionic converter for converting electrical pulses to rectangular waves." 13657. 30th March, 1943. (602313.)

Philco Radio & Television Corporation.—" Method and means for translating mechanical energy." 18719. 1st October, 1943. (602455.)

S. S. Cramer.—" Radio tuning apparatus." 20615. 30th December, 1943. (602457.)

1945

E. I. Du Pont De Nemours & Co., and R. A. Hoffman. —" Electro-deposition of metals." 3440. 12th February, 1945.. (602591.)

Marconi's Wireless Telegraph Co., Ltd.—" Modified sweep circuit for cathode-ray tubes." 3522. 10th September, 1943. (602592.)

Plessey Co., Ltd. (Mallory & Co., Inc., P. R.).— " Electric vibratory interrupter." 3545. 13th February, 1945. (602461.)

Telephone Rentals, Ltd., F. A. Wilding, and F. W. Davis.—" Time controlled electric signalling or controlling systems." 4485. 22nd February, 1945. (602462.)

Autophon Akt.-Ges.—" Telephone systems adapted for using loud speakers and normal receivers." 5808. 10th December, 1942. (602333.)

Marconi's Wireless Telegraph Co., Ltd.—" Electric space discharge circuits. 6863. 27th March, 1940. (602,464.)

A. P. Clouez.—" Electric clippers for long and short hair." 7938. 4th August, 1942. (602337.)

J. L. Baird.—" Large screen television." 8908. 10th, April, 1945. (602341.)

Sperry Gyroscope Co., Inc.—" Electrical transmission and control systems, remote indicating systems, and improved indicators." 10857. 29th April, 1944. (602344.)

Philco Corporation.—" Refrigerator apparatus." 13995. 25th February, 1944. (602473.)

Bendix Aviation Corporation.—" Electrical means for reproducing motion at a remote point." 16411. 22nd May, 1944. (602352.)

English Electric Co., Ltd., P. L. Mardis, and S. A. Smith.—" Electrical contactors." 16886. 3rd July, 1945. (602354.)

Sir E. T. Fisk and W. Soby.—" Methods of making electrically conducting patterns such as wiring circuits, coils and the like." 21544. 23rd August, 1945 (Cognate application 9901/46.) (602492.)

W. P. Williams (Dayton Precision Manufacturing Co.).—" Commutator assembling machine." 21655. 23rd August, 1945. (602494.)

W. W. Triggs (Garrett Corporation).—" Electric motor control means." 22941. 27th May, 1943. (Divided out of 573,820.) (602496.)

Soc. D'Application Des Brevets Cotal.—" Electromechanical device operating simultaneously as clutch, reverse gear and change-speed gear." 23551. 28th December, 1943. (602497.)

G. R. Shepherd (Westinghouse Electric International Co.).—" Electric steam irons." 24104. 18th September, 1945. (602498.)

F. J. M. Theunissen.—" Devices for the selective opening of electric circuit-breakers protecting installations." 24764. 25th January, 1944. (602625.)

Philips Lamps, Ltd.—" Electric discharge tubes." 24905. 29th June, 1940. (602361.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—" Electric switches more particularly of the controller drum type." 24906. 8th June, 1940. (602500.)

J. Hendy Iron Works.—" A.c. induction motor speed control." 24978. 1st August, 1944. (602377.)

Standard Telephones & Cables, Ltd., and J. S. P. Roberton.—" Telephone receivers." 25568. 20th September, 1946. (602379.)

Automatic Telephone & Electric Co., Ltd.—" Electrical impulsing circuits." 26843. 23rd November, 1944. (602388.)

C.A.V., Ltd. and W. A. Bevis.—" Electric starting systems for internal-combustion engines." 26895. 15th October, 1945. (602399.)

F. B. Dehn (Fairbanks, Morse & Co.).—" Cast conductor members for electrical apparatus." 26935. 15th October, 1945. (602409.)

Bendix Aviation Corporation.—" Control systems for superchargers." 26940. 19th July, 1944. (602410.)

Bendix Aviation Corporation.—" Supercharger control systems." 26941. 18th July, 1944. (602411.)

Bendix Aviation Corporation.—" Solenoids." 26942. 21st September, 1944. (602412.)

Pyrotenax, Ltd. and J. G. Lewis.—" Manufacture of metal-sheathed electric cables." 26959. 15th October, 1945. (602417.)

Pyrotenax, Ltd. and J. G. Lewis.—" End-stripping tools for metal-sheathed electric cables." 26960. 15th October, 1945. (602418.)

General Motors Corporation.—" Separators for electric storage batteries." 26991. 6th November, 1944. (602520.)

Kolster Brandes, Ltd. and L. G. Chaffey.—" Electrical connecting plugs, incorporating cord-gripping means." 27031. 16th October, 1945. (602528.)

Marconi's Wireless Telegraph Co., Ltd. and J. W. Sanger-Stevens.—" Electrical bonding couplings." 27078. 16th October, 1945. (Addition to 511,448 and 547,032.) (602536.)

General Electric Co., Ltd. and A. J. Biggs.—" Apparafor the measurement of impedance at high-frequencies." 27182. 17th October, 1945. (602631.)

Philips Lamps, Ltd.—" High-frequency amplifying circuits." 27203. 22nd June, 1940. (602634.)

Philips Lamps, Ltd.—" Neutralized high-frequency amplifiers." 27204. 14th June, 1940. (602635.)

J. Lucas, Ltd. and H. C. Taylor.—" Electrical plug and socket connections." 27207. 17th October, 1945. (602636.)

Sangamo Weston, Ltd.—" Protection of electrical devices from moisture, fumes and the like." 27435. 31st January, 1945. (602423.)

E. F. Clark.—" Electrical apparatus employing bridge circuits." 27643. 20th October, 1945. (602425.)

British Thomson-Houston Co., Ltd.—" Magnetic recording heads." 28082. 2nd November, 1944. (602427.)

G. H. Mills and S. R. Stone.—" Fusible plugs such as are used in steam-generating apparatus." 28564. 29th October, 1945. (602561.)

W. W. Triggs (Farnsworth Television & Radio Corporation).—" Unidirectional voltage generator." 28958. 31st October, 1945. (602562.)

Metropolitan-Vickers Electrical Co., Ltd. and G. J. Scoles.—" Electronic timing devices." 29205. 2nd November, 1945. (602642.)

Naamlooze Vennootschap Fabriek Van Electrische Apparaten Voor-Heen F. Hazemeijer & Co.—" Electric circuit-breakers having current transformers attached." 30733. 16th July, 1942. (602362.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—" Electric switches with roller contacts." 31205. 13th July, 1940. (602430.)

Metropolitan-Vickers Electrical Co., Ltd. and R. W. Bailey.—" Power plant more especially for ship pro-

pulsion." 33512. 11th December, 1945. (602573.)

Permoflux Corporation.—"Hand-held microphone device." 33601. 31st March, 1945. (602432.)

Philips Lamps Ltd.—"Electric current-converting tubes." 34496. 2nd December, 1940. (602435.)

Solvay & Cie.—"Electrolysis apparatus." 34637. 23rd July, 1943. (602436.)

P. Demart.—"Electrical equipment for subterranean gasification installations." 34726. 9th May, 1944. (Cognate applications 34727/45 and 34728/45.) (602578.)

A. E. Graf.—"Electric switches combined with plug-and-socket coupling devices." 34913. 27th December, 1945. (602580.)

Philco Radio & Television Corporation.—"Couplings for electrical conductors." 34929. 29th September, 1944. (602437.)

Kellogg Switchboard & Supply Co. and R. D. Collins.—"Method and means for making elastic coil cables." 34966. 27th December, 1945. (602581.)

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New Day Electrical Accessories, Ltd. and L. E. W. C. N. Davey.—"Electric tumbler switches." 13224. 1st May, 1946. (602443.)

Wico Electric Co.—"Flywheel magnetos." 15670. 21st September, 1945. (602363.)

Wico Electric Co.—"Ignition contact breaker point mechanisms." 15787. 21st September, 1945. (602364.)

English Electric Co., Ltd., P. L. Mardis and S. A. Smith.—"Electric switch contacts." 23234. 3rd July, 1945. (Divided out of 602,354.) (602365.)

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English Electric Co., Ltd., P. L. Mardis and S. A. Smith.—"Electrical contactors." 811. 3rd July, 1945. (Divided out of 602,354.) (602368.)

Automatic Electric Laboratories, Inc.—"Electrical contact spring sets suitable for use on electromagnetic relays." 838. 26th February, 1943. (602369.)

Automatic Electric Laboratories, Inc.—"Electromagnetic relays. 839. 26th February, 1943. (602370.)

Automatic Electric Laboratories, Inc.—"Contact spring assemblies for electrical switching devices." 840. 21st September, 1942. (602371.)

Amended Specifications Published

Western Electric Co. Inc.—"Terminal apparatus for electric signalling systems. (575432.)

B. J. Mayo.—"Electron discharge devices employing hollow resonators. 576121.

B. J. Mayo.—"Electron discharge devices employing hollow resonators. 576127.

Standard Telephones & Cables, Ltd. (International Telephone Development Co. Inc.).—"Tube arrangement for frequency doubling." 578270.

Standard Telephones and Cables, Ltd., and others.—"Multiplex high frequency electrical pulse signalling systems." 582199.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Anglesey.—28th June. Education Committee. Electrical installations in twenty-one schools. (4th June.)

Angus.—28th June. County Council. Electrical work, Arbroath High School. Specification from James McGregor, County Buildings, Forfar.

Argentina.—BUENOS AIRES.—30th July. Department of Water and Electric Power. Supply and erection of turbo-alternators, pressure pipe line, etc., at the Agua Negra Dam, Province of La Rioja.

National Oilfields Department.—14th July. Deep-well pumps. 15th July. Magnetometers. 28th October. Department of Military Manufactures (*Dirección General de Fabricaciones Militares*, Av. Cabildo 65, Buenos Aires). Factory for the manufacture of electrical conductors, including the supply of machines, installations and spares; and the layout and erection of the machinery and auxiliary services.

Australia.—SYDNEY.—21st July. N.S.W. Railways. 20,000-kVA synchronous condensers and control equipment for Carlingford terminal station. Particulars from the chief electrical engineer.

Coventry.—Education Committee. Electrical installation in new primary school. Applications for specifications and forms of tender from the city architect by 23rd June. (See this issue.)

Iran.—Ministry of National Economy and Department of Civil Aviation. Chemistry laboratory and civil aviation equipment, including field lighting and radio equipment. Specifications from Chancery of the Iranian Embassy, 50, Kensington Court, London, W.8.

New Zealand.—2nd July.—WELLINGTON.—Post and Telegraph Department. Copper wire, cadmium-copper wire and cadmium-copper tape. (Ref. E.P.D. 36652/48).*

South Africa.—JOHANNESBURG.—Railways and Harbours. 29th July. Electrically heated horizontal box type furnace suitable for carburizing and general heat treatment of steel.*

PRETORIA. — 24th August. City Council. 33-kV and lower voltage auxiliary transformers. (See this issue.)

Uruguay.—12th July.—MONTEVIDEO.—Usinas Electricas y Telefonos del Estado. 5,500 copper sleeves for telephone cable splices and 75 pliers for use with the sleeves. (Ref. E.P.D. 36635/48).*

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

London.—County Council. Accepted. Wiring and fittings for the rewiring of the electric lighting and power systems at Tooting Bec Hospital.—G. N. Haden & Sons.

Newcastle-on-Tyne.—City Council. Accepted. Wireless equipment for Municipal Airport.—E. K. Cole. Supervisory control equipment at Northbourne Street, Diana Street and Walker Road substations (£4,191).—Hackbridge & Hewittic Co.

Strood.—U.D.C. Accepted. Electrical installation in thirty houses at Cliffe, near Rochester (£1,500).—Lauray Electrical Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Anglesey.—Electric light and power installation in 23 primary schools and Menai Bridge interim secondary school; county architect, Shire Hall, Llangefni.

Barnard Castle.—Houses (46); R.D.C. surveyor, Galgate, Barnard Castle.

Bathavon.—Houses (71) for miners and agricultural workers; F. Kelway, R.D.C. surveyor, 10, Green Park, Bath.

Border.—Houses (40); R.D.C. surveyor.

Brighton.—Factory; Lacourbat, Ltd., Factory Road.

Burnley.—Electrical installation, Bank Hall Hospital (£1,235), for Town Council.

Caythorpe (Lincs.).—Farm institute, Caythorpe Court (£60,000); county architect, Sleaford.

Crewe.—Works, Weston Road, for British Rollmakers Corpn., Ltd.; Sir Alexander Gibb & Partners, Queen Anne's Lodge, S.W.1.

Dudley. — Factory, Birmingham Road; Grainger & Smith, Ltd., King Street.

Eastbourne.—Houses (74), Davis-Chatfield estate; borough engineer.

East Heslerton (Yorkshire).—Electric lighting installation at church; the Vicar.

Enfield.—Houses (20), off Lavender Hill, for Middlesex Regiment War Memorial Committee; Brian L. Sutcliffe & Partners, architects, 5, Manchester Square, W.1.

Houses (62), Bullsmoor Lane; engineer and surveyor to U.D.C., 7, Little Park Gardens.

Extensions to factory, Scotland Green Road; United Flexible Metallic Tubing Co., Ltd.

Eston.—Houses (50), Eston Jubilee Road; U.D.C. surveyor.

Gateshead-on-Tyne.—Factory extensions for the Grip Reinforcement Co.; Gordon Durham, Ltd., Boldon Lane, East Boldon, Durham.

Hull.—New works north of Hedon Road; Hollis Bros. & Co., Ltd.

Ilford.—Rebuilding works for Royal Jersey Laundry, Redbridge Lane; P. G. Lees, architect, 3, Cherrydown Avenue, London, E.4.

School, Strafford Avenue (£56,635); county architect, Chelmsford.

Kingsbridge.—X-ray department, nursing staff quarters, out-patients' department, etc., at South Ham Cottage Hospital; Grayson & Goldsmith, architects, 7, Bridge Street, Bath.

Lincoln.—Two-storey office block (£20,090) for Lindsey C.C.; county architect, Newland, Lincoln.

London. — HAMPSTEAD. — Rebuilding laboratories and other departments at the Marie Curie Hospital, Fitzjohn's Avenue; Adams, Holden & Pearson, architects, University of London, W.C.1.

DEPTFORD.—Flats, Shardloes Road, Rokeby Road and Erlanger Road; H. V. Ashley & Winton Newman, architects, 3, Verulam Buildings, Gray's Inn Road, W.C.1.

NEW CROSS.—Three-storey block of flats, Waller Road; Haberdashers' Company, 1, Vintners Place, Upper Thames Street, E.C.4.

Morpeth.—Houses (20); R.D.C. surveyor.

Northallerton.—Houses (24); R.D.C. surveyor.

Northampton.—Factory, Kingsthorpe Hall estate; Church & Co., Ltd., shoe manufacturers, Duke Street.

Nottingham.—Works, Meadow Lane; Henton & Chattell, Beeston, Notts.

Ponteland.—Conversion of Kirkley Hall into a farmers' training institute (£43,885); county architect, County Hall, Newcastle-on-Tyne.

Radcliffe.—Additions and laboratory, Dale End Works; Radcliffe Paint Manufacturing Co., Ltd.

Richmond (Surrey).—Houses (30), Hawkers Field North, Ham; borough engineer, Hotham House, Heron Court.

Rochdale.—Hostel for 500 workers, Kirkholt and The Mount sites; borough surveyor, Town Hall.

Salford.—Rebuilding paper works, Lower Broughton Road; Olive & Partington, Ltd.

Sheffield.—New works; Firth-Vickers Stainless Steels, Ltd., Staybrite Works.

Works, Norton Lane; Moore & Wright (Sheffield), Ltd., Trafalgar Street.

South Shields.—Rewiring Baring Street schools (£1,770) and Laygate Lane county primary school (£1,300); borough engineer.

Stafford.—Rebuilding wagon workshop and extensions to office and stores and equipment (£30,000); W. G. Bagnall, Ltd., Castle Engine Works.

Stockport.—Bakery, Reddish, for John Bakewell, Ltd.; J. R. Gradwell, architect, 51, South King Street, Manchester, 2.

Warrington.—Factory extensions, Sandy Lane, Orford; Orford Tanning Co., Ltd.

Wilton (Yorks).—Houses in connection with industrial development scheme for Imperial Chemical Industries, Ltd.; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Worksop.—Factory, Carlton Road, for Bairns-Wear, Ltd., Nottingham; T. Cecil Howitt & Partners, architects, St. Andrew's House, Mansfield Road, Nottingham.

Wrexham.—County primary school for Welsh-speaking children; G. D. Wiles, Denbighshire county architect, Church House, 45, Regent Street.

Houses (100), Queen's Park; A. Clark, housing officer, 1, Grosvenor Road.